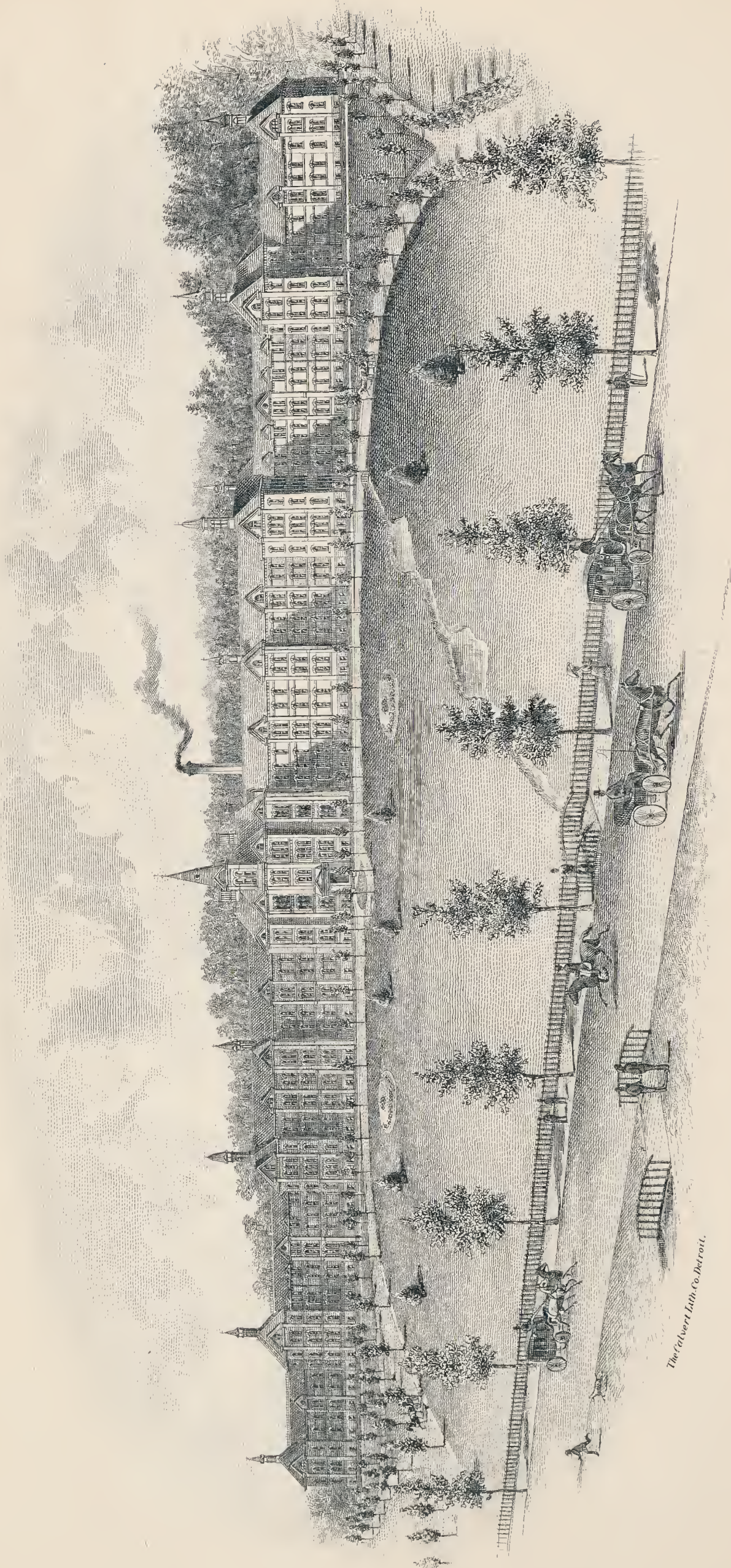
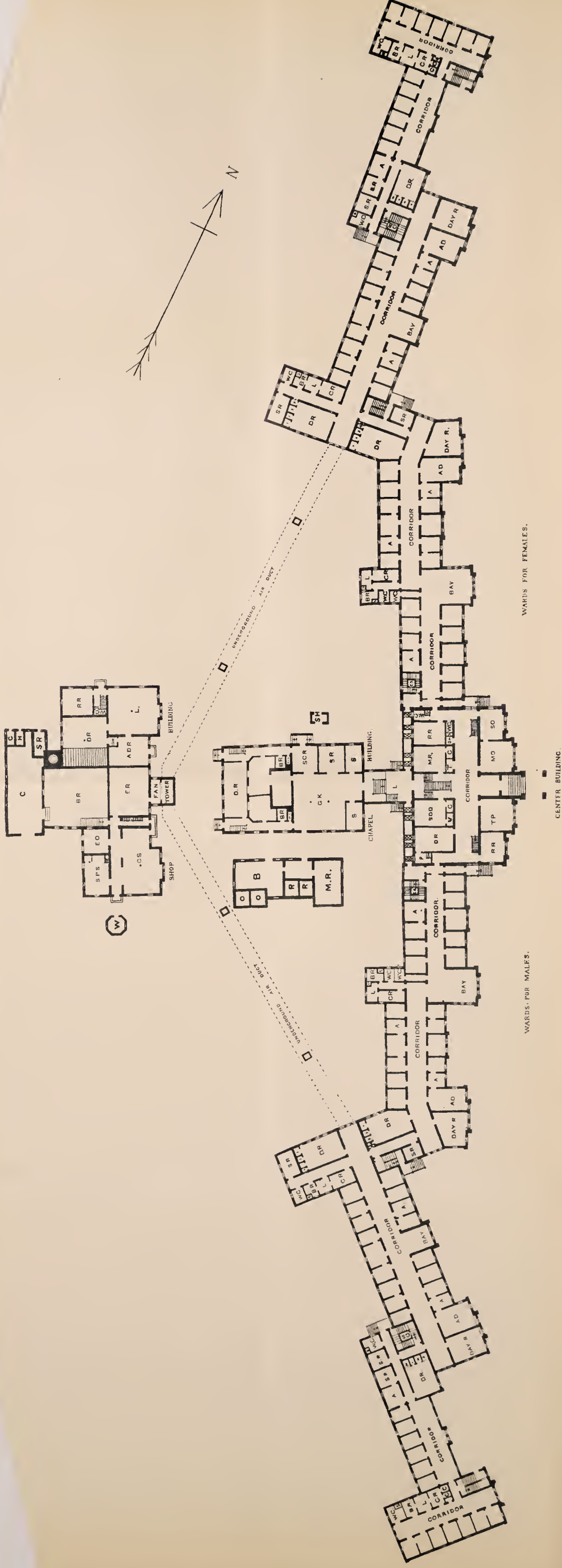


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NORTHERN MICHIGAN ASYLUM, TRAVERSE CITY, MICHIGAN.



PLAN OF FIRST STORY.

SHOP BUILDING.

- W.—Well House.
- L.—Laundry.
- D. R.—Drying Room.
- R. R.—Reception Room.
- A. D. R.—Assorting and Delivery Room.
- D. W.—Dumb Waiter.
- C. S.—Carpenter Shop.
- S. P. S.—Smith and Pipe Shop.
- E. O.—Engineer's Office.
- B. R.—Boiler Room.
- E. R.—Engine Room.
- W. C.—Water Closet.
- C.—Coal Shed.
- H.—Hose House.
- S. R.—Soap Room.

CHAPEL BUILDING.

- S.—Stores.
- R.—Refrigerator.
- G. K.—General Kitchen.
- S. C. R.—Steam Cooking Room.
- S. R.—Sunk Room.
- W. C.—Water Closet.
- B. R.—Bath Room.
- B.—Bakery.
- O.—Oven.
- D. R.—Dining Room.
- S. H.—Swill House.

WARDS.

- A.—Attendant's Room.
- D. R.—Dining Room.
- C. R.—Clothes Room.
- L.—Lavatory.
- B. R.—Bath Room.
- W. C.—Water Closet.
- S. R.—Sick Room.
- S.—Shaft for Pipes
- D.—Dust Shaft.
- DAY R.—Day Room.

- A. D.—Associated Dormitory.
- D. S.—Drying Shaft.
- C.—Closet.
- C. S.—Clothes Shaft.
- Patients' Rooms blank.
- 1—China Closet.
- 2—Dumb Waiter.
- 3—Sunk.
- 4—Drying Shaft.

} D. R.

CENTER BUILDING.

- R. R.—Reception Room.
- T. P.—Trustees' Parlor.
- M. O.—Medical Office.
- S. O.—Superintendent's Office.
- P.—Pantry.
- D. R.—Dining Room.
- SD. O.—Steward's Office.
- M. R.—Matron's Room.
- C.—Closet.
- D. W.—Dumb Waiter.
- S.—Shaft for Pipes.
- W. C.—Water Closet.
- L.—Library.
- V.—Vault.
- T.—Telephone Office.

REPORT

OF THE

10.

BOARD OF COMMISSIONERS

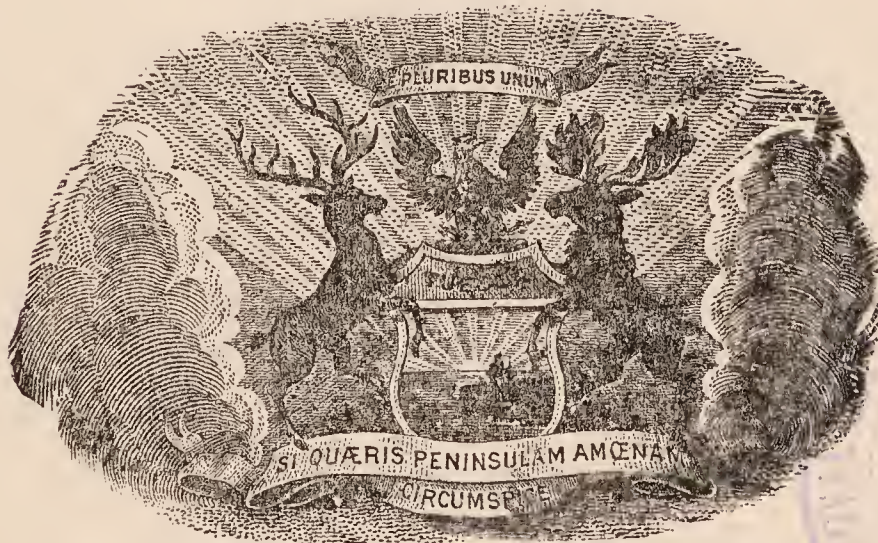
OF THE

NORTHERN ASYLUM FOR THE INSANE

AT

TRAVERSE CITY, MICHIGAN,

FROM OCTOBER 1, 1884, TO THE FULL COMPLETION OF THE
WORK, NOVEMBER 10, 1886.



BY AUTHORITY.

LANSING:
THORP & GODFREY, STATE PRINTERS AND BINDERS.
1886.



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REPORT OF THE BOARD OF COMMISSIONERS.

NORTHERN MICHIGAN ASYLUM, }
TRAVERSE CITY, MICHIGAN, }
November 10th, 1886.

TO THE HON. R. A. ALGER,
Governor of the State of Michigan:

SIR—In accordance with the requirements of the law therefor the Board of Commissioners, having finished and equipped the Northern Asylum for the Insane, at Traverse City, the trust with which the Board was charged, respectfully submits this final report, which covers a period from September 30, 1884, to November 10, 1886. The report of the Superintendent and of the treasurer is herewith also presented.

The present report, while dealing in detail with the building and furnishing operations of the fiscal years 1885 and 1886, seeks to incorporate also a general review of the whole past history of the Institution, the expenditure of money and results therefrom, the characteristic constructive features and reasons therefor, and the purposes, methods and administration of the Board of Commissioners. This can be done without materially enlarging this report, since during the fiscal years 1885 and 1886 a large proportion of the total outlay was incurred ; this outlay, for numerous purposes, very diverse in character, a full report of which will include nearly all the topics treated in previous reports. By adhering to the method above outlined, this, the final report, will stand as a unit, complete in its general information, and previous reports need be consulted only in special cases where a knowledge of details is desired.

RETROSPECT.

Scarcely had the Eastern Asylum at Pontiac received its transferred patients before the necessity for additional asylum accommodations was felt. Those unfortunate patients, who by necessity had been confined within county poorhouses and jails, or at home in private receptacles, were most happily and humanely cared for, as required by law, in the new asylum ; but the admission of the accumulated cases of several years rapidly filled the asylum, and the relief experienced was but temporary. Two months after the opening of the Eastern Asylum the trustees, by report of September 30, 1878, urged “ that immediate steps be taken for the establishment, location and erection of an additional asylum.” At the same time the trustees, as a means of temporary relief, asked, on the ground of necessity and true economy, for money to erect additional buildings to be occupied by epi-

leptics and quiet patients, forty of each sex. The Michigan Asylum through its Trustees also stated the necessity for more asylum accommodation. The Legislature of 1878 and 1879, however, did not deem it wise to make an appropriation following so closely after the opening of the new asylum at Pontiac.

As the time for the next Legislature approached the necessity for relief, through action of the Legislature, became more and more urgent, and an organized effort to secure additional provision for the insane was made by the Boards of Trustees of the Eastern and Michigan Asylums at the joint meeting held in May, 1880, by specifically and formally recommending and urging the Legislature to appropriate money for "an additional asylum for the insane, similar in plan, purpose, and grade of provision to the asylums already built." The report of each asylum for the fiscal year 1880 reiterated the necessity and urged immediate action, stating that the asylums were "practically closed to the admission of patients." During the following session of the Legislature the trustees and superintendents severally used their influence to secure the desired legislative action.

These efforts and influences prevailed. The Legislature of Michigan, always liberal in its charities, enabled from reliable data to recognize clearly the gravity of the situation, made, in June, 1881, with scarcely a dissenting voice, an appropriation for an additional asylum for the insane by an act, in language and amount almost identical with that which established the asylum previously built. Nor was this all. The same Legislature, reëffirming most emphatically the previously adopted policy of the State and the obligation therefrom to maintain the indigent insane at public expense, appropriated as a means for immediate relief \$75,000 for the enlargement of the Eastern Michigan Asylum at Pontiac by the addition of wings.

A Board of Commissioners, charged with the duty of selecting the location for the new asylum and to purchase a site was constituted, by the appointment of Messrs. Perry Hannah, Dr. E. H. Van Deusen and Milton H. Butler.

The Commissioners, unlimited by the terms of the act as to the portion of the State within which they should seek for a site, first familiarized themselves with the amount and influence of the existing State asylum accommodation in its relation to meeting or failing to meet the present and prospective needs of different sections of the State; and, justifying the prevailing sentiment, determined, in view of a very large and rapidly developing area of the State that the interests of the insane would be best subserved by the location of the proposed institution with special reference to the requirements of a distinctively northern district.

The examination of the sites was commenced September 20, 1881, and terminated by the location of the institution at Traverse City the following November. By the choice of this location the Board hoped to secure in a large degree to enfeebled patients, and those suffering from malarial disease in its varied form, the characteristic climatic influences that have made Northern Michigan a delightful and popular summer resort. The land selected possessed an unexampled combination of those desirable features pertaining to an ideal site, a dry, porous soil, consequently healthy, eastern frontage for the building, an elevation slightly yet sheltered, an ample supply of pure water, good facilities for drainage and sewerage, proper distance and isolation from the city, wooded grounds broken and cut with hills and ravines, admirably adapted to the recreation of patients, and, withal, a most

beautiful outlook, commanding the city, Grand Traverse bay and the hills beyond.

The Locating Board purchased 339 91-100 acres of land, together with the buildings thereon, at a total cost of \$19,611.83. While the Board was authorized to receive donations of land, this method of acquiring title to the site, implying, as it does, that an inducement offered may influence the decision in favor of the would-be donors, was neither invited nor encouraged. The total cost of the site, however, was not borne by the State. The owners of two of the several tracts were unwilling to sell at prices considered by the Board full and fair valuation therefor. The additional sum asked amounted to \$6,000, which was contributed by the citizens of Traverse City. Hon. Perry Hannah still further reduced the cost to the State by donating forty acres of timber land possessing most excellent soil.

This retrospect would not be complete without mentioning the further tract of land, 56 66-100 acres, selected by the Locating Board but not purchased, land deemed essential to the purposes of the Institution. A legal obstacle prevented the purchase, Mr. Hannah being both the owner, and, as a Commissioner, a buyer. The Board reported the circumstances of the case to the succeeding Legislature, and asked that permission be granted to make the desired purchase. The Asylum Legislative Committees visited Traverse City, and, on returning, unanimously and strongly urged the justice and expediency of acquiring possession of the land. Unfortunately, through influences wholly disconnected with the desirability of the purchase, the bill did not pass. The Board thereupon considered its duty to have been discharged, and the matter is here alluded to only as a record of the past. It is, however, proper to say that all the reasons that were good for the purchase four years ago are cogent to-day, the occupation of the asylum demonstrating fully their force and correctness. The city has rapidly grown toward the desired tract, enhancing its pecuniary value and threatening to overflow on to it beyond reclamation whenever Mr. Hannah shall discontinue his generous and losing purpose of holding it at the original price subject to purchase by the Asylum. This matter as to the future is treated in the report of the Board of Trustees, to which reference may be had for further information.

After the selection of a site a Building Board was constituted, by adding to the Locating Board Messrs. Alexander Chapoton, Sr., of Detroit, and Henry H. Riley, of Constantine, making a Board of five members. To this Board was entrusted the responsibility of procuring and adopting plans for asylum buildings, and for constructing, furnishing and equipping the same. Within the limits of the appropriation no restriction or direction as to character, size or construction was placed on the Board.

At the first meeting of the Board C. M. Wells was appointed to fill the positions of Superintendent and Secretary, provided for by law, and in January, 1882, Gordon W. Lloyd, of Detroit, was selected as architect.

Much time and thought was spent preliminary to and during the architectural work, in determining the type of asylum structure to be embodied in plans; its capacity in whole and in parts; the interior arrangements and classifications, and the architectural, hygienic and economic features to be incorporated. An examination of the site in its relation to the proposed building was made, resulting in an adaptation of the ground plan by bending forward the extreme wings, so as to afford a view of Grand Traverse Bay from all the wards, and at the same time bring the foundation on land more nearly level.

The Board determined to expend the money in the erection of an asylum building, complete in itself, substantial and durable in construction, plain but tasty in appearance, as nearly fire-proof as the means would admit, and arranged with a view for attaining the highest results of treatment through proper classification, segregation of patients and their individual care and hygienic surroundings. This decision kept in view the prospective demands of the future for a materially increased population, and regarded also the tendency of the times to regard with favor the cottage system. The centre structure would serve as a nucleus for a large number of detached buildings or cottages, materially reducing the building cost per patient in proportion as the population should be increased. To carry out this possibility, however, the administration building and the working departments must be built with a capacity to anticipate the future. The funds placed at the disposal of the Board would not allow the construction of a proper central structure looking to a large population, of say one thousand, and the detached buildings also; while with or without cottages the central hospital building, for the treatment of the disturbed classes, the aged and very infirm, and those suffering from acute disease, is absolutely indispensable. To the Board it seemed the wiser course to erect an administration building and working departments adequate to the needs of the prospectively increased population, and to place on either side wards for patients, arranged and apportioned with reference to the classification and the requirements of the classes to be treated in this portion of an enlarged asylum rather than to defeat the possibility of further extension by providing in the present for a somewhat larger population at the cost of centre buildings inadequate to the demands of the future.

The preparation of correct plans and exact specifications was a work requiring considerable time and much careful research. During this preparation in order to forward the work, the Board, after duly advertising, let contracts for the common and pressed brick that would be required by the main contract, and for a large portion of the rubble and footing stone for the foundations. A brick-yard was immediately established at Traverse City, on land owned by Hannah, Lay & Co., the clay of which was donated for asylum use, and the brick-yard was operated by Messrs. Farr, Avery & Co., the contractors, who utilized a large portion of the brick season of 1882, thus advancing the brick supply by nearly a year, and who, before the advent of cold weather, had made one million brick.

Messrs. Wing, Morgan & Harford, the contractors for stone, delivered from quarries in Wisconsin a large quantity of rubble and footing stone. This accumulated supply of building material materially facilitated progress when the plans were ready, and the main contract had been executed.

The summer of 1882 was full of labor trouble; contractors stood uncertain and timid, and hesitated on large works to make pecuniarily, fair proposals. Prices were high and unsettled, and the outlook was very unfavorable for letting the proposed work within the limits of the appropriation. This limit must not be exceeded, while to curtail the work or lop off any portion would be justified only by a most unfortunate necessity. Under these circumstances the full completion of the plans was not urgently pressed, and the work was not advertised until after the business outlook began to brighten.

At the time proposals were opened, October 26, 1882, after advertising for six weeks, the labor market was comparatively settled, through the abandon-

ment of the hopeless efforts to maintain the high prices of former years. The inevitable result followed. Labor endeavoured to make up for lost time, competition became active and contractors fearless, resulting in proposals that dissipated the unfavorable anticipations of the Board. The State gained pecuniarily through the breaking down of the elated prices of 1880 and 1881, and the Board was enabled to let the contract on the basis of the plans as prepared, embodying all the features considered essential or distinctive, and within the sum appropriated.

This, the main contract, was let to Bentleys & Nowlan, of Madison, Wis., for the sum of \$272,169.67, and included the general construction of the building in carpenter and mason work and the related branches of slating, tinning, painting, glazing, iron work, &c., but did not include the brick and stone supplies already contracted for.

The constructive work of the years 1883 and 1884 has been previously and fully reported. It is sufficient to say that under the contracts before named the work was pressed forward very rapidly and without interruption or delay from any cause. On September 30, 1884, the date of the preceding report, the brick and stone walls had been completed. Cut stone work and work on cornices on roofs were finished with unimportant exceptions. The glazing was well forward, the painting had kept pace with the wood and iron work, and the building throughout, except the administration building, had received the first coat of plastering. Out of \$400,000 appropriated a total outlay of \$304,475.66 had been incurred, and the completion of the institution within the contract time seemed assured.

FURNISHING AND EQUIPPING THE ASYLUM.

Money for furnishing the Asylum and equipping it with apparatus for heating, appliances for cooking, baking, fire protection, ventilation, etc., the machinery for outfitting the laundry, carpenter and smith shops, together with the money for plumbing and sewerage, and for stock, vehicles, implements, etc., was not appropriated with the building fund. Before the beginning of the period covered by this report the building work had so favorably advanced that considerable of the work above named could have advantageously been started. Estimates, however, could neither be intelligently made by the Board, nor satisfactorily considered by the Legislature as early as the session of 1882 and 1883, and an appropriation was not sought prior to the session of 1884 and 1885. The Board called the attention of this Legislature to the urgent demand for early legislation, and pointed out the evils that must inevitably result from any considerable delay in making the appropriations, and consequently in opening the Asylum. This necessity for prompt action was emphasized by the Board of Corrections and Charities, and by both the out-going and in-coming Governors.

Very carefully prepared estimates, in detail, showing minutely the number, kind and cost of all articles to be purchased or work to be performed with the money sought, were laid before the Legislature, and therewith statements showing the reasons for the various expenditures. The pressure of other interests, however, proved an obstacle to early legislation, and the appropriations were not approved until May 4, 1885, and until that time the commencement of the various works thereunder was postponed.

Although a little tardy in making the appropriations the Legislature recognized fully the justice of the demands and the needs for funds as set forth,

and appropriated the estimated sums in full, aggregating \$121,700. The several purposes for which money was appropriated as named in the act, their purposes grouped together and consolidated from the estimates, were as follows:

Furnishing wards for 500 patients and 50 attendants; furnishing administration building, and dormitories of shop and chapel buildings, including three dining rooms.....	\$30,375 00
Furnishing offices, chapel and dispensary,.....	2,475 00
Cooking apparatus, laundry apparatus, baking apparatus, iron working apparatus, and carpenter apparatus.....	7,660 00
Heating apparatus, including boilers for power purposes,.....	40,245 00
Plumbing of Asylum complete, including hot and cold water distribution and hot water boilers.....	13,375 00
Sewers, drains, and cisterns.....	3,430 00
Implements, vehicles and utensils, stock, including farm and carriage horses; engines 92-horse-power, complete in place; and shafting, hangers, belting, pulleys, etc.....	7,340 00
Fire protection,.....	4,115 00
Ventilation, including fan and engine for same,.....	3,570 00
Grading,.....	1,600 00
Telephone communication, dumb waiters and Asylum bell.....	1,705 00
Sidewalks and airing courts,.....	1,260 00
Scientific instruments, books, pictures, musical instruments, etc.,	1,800 00
Supplying Asylum with water, including pump and well complete,	2,750 00
Total.....	<u>\$121,700 00</u>

PROGRESS OF THE WORK.

During the fall of 1884 the main contractors, Messrs. Bentleys & Nowlan, favored by declines in prices and a consequently abundant labor market, continued to urge forward the work, completing all brick and stone mason work, finishing the slating, tin and galvanized iron work of roofs, cornices, pediments and ventilating towers, hanging and glazing all sash, and continuing the painting and finishing. Moreover, the approach of winter saw the rough or lower floors laid, the wire cloth or lathing all on, and covered wholly with the first and partially with the second coat of plastering.

In the absence of the heating apparatus little could be accomplished during the winter months, and few men were employed.

The spring of 1885 brought renewed activity. The plastering, both plain and ornamental, was completed, floors deafened, and the carpenter and joiner force largely increased, as the work on floors, doors, casing, stairs, wainscoting, etc., in turn became possible, while the painters and finishers followed the joiners as closely as warranted by the demands of good work.

The contract of Bentleys & Nowlan, in the sum of \$272,169.67, was satisfactorily closed November 5, 1885, by final payment of \$69,012.19, or \$9,920.46 less than the contract price. This saving represents the net result of changes in the contract by additions thereto and deductions therefrom, the aggregate sums paid under this contract being \$262,249.21.

In advance of the appropriations for furnishing, apparatus, etc., and pending their consideration by the Legislature, plans and specifications were pre-

pared by the Superintendent, and proposals invited for power and heating boilers. The contract was awarded January 21, 1885, to the Lansing Iron and Engine Works in the sum of \$6,850 for two tubular power boilers six feet by sixteen feet each, and for two drop-return-flue heating boilers each eight feet by twenty-six feet four inches, all of steel. As was anticipated, the construction of these large boilers required considerable time, and they were not delivered until August, 1885, some time after the progress of the heating contract had rendered their presence very desirable. It will be seen that a failure to start the boiler work in advance of the appropriation therefor would have resulted in a delayed occupation of the Asylum by several months. The Board was warranted in thus contracting through the possibility of making the payments from the building fund should the proper appropriation fail. Credit must be given to the Lansing Iron and Engine Works for earnest endeavour to carry forward the difficult work of constructing the large boilers in conformity, both in letter and spirit, to the plans and specifications therefor.

During the winters of 1884 and 1885, as before stated, but little building work could be done, and time was given to fully consider the varied needs of the Institution in their relation to the most approved appliances and practices of the present time, in heating and plumbing apparatus, machinery, etc., and to embody the studies thereon in plans and specifications—a work entrusted to the Superintendent.

In order to forward the work the Board invited proposals, by advertising, for heating and plumbing prior to the action of the Legislature on the Appropriation bill, hoping, as proved to be the case, the date for opening the proposals would find the money available.

Proposals were opened June 4, 1885, and a contract for the major portion of the heating apparatus was entered into with Messrs. Samuel I. Pope & Co., of Chicago, in the sum of \$19,379; and the contract for plumbing, fire protection and portions of the heating, with Messrs. Rundle, Spence & Co., of Milwaukee, Wis., in the sum of \$17,829.84. These contracts were well placed. The State received the advantage of the lowest bids, and in each case the work was begun immediately, and carried forward to completion in a manner to attest both the technical skill and the fair-mindedness of the firms doing the work.

The contract for plumbing and fire protection was closed December 3, 1885, a total of \$18,224.98 being paid, and the contract for heating was closed the same date, the payments aggregating \$19,520.54. In both of these contracts the plans and specifications were executed without material change, and the additional amounts paid above the contract prices represent almost wholly work not included in the contract, as the work of heating and plumbing the bakery building, and the plumbing wastes for kitchen and laundry fixtures. The report of the Superintendent herewith printed shows in some detail the nature, extent, and cost of the work covered by these contracts. After nearly a year of daily test the workmanship has stood without failure, and the methods adopted have satisfactorily and thoroughly accomplished the desired ends.

The Board hesitated long before adopting the electric light to the exclusion of possible lighting by other means should electricity prove but partially successful. At the time when called on to decide, lighting by electricity for the purposes of an Insane Asylum was still an experiment. It

required strong faith during the construction of the building to allow the omission of piping for gas, looking forward to the possible contingency of failure in the electric light. But faith took form under investigation and examination, until the result appeared less an experiment than a certainty. The old was discarded, the new was tried and found to be a most decided success.

This success is shown in double the quantity of light as compared with gas, and at half the cost; in a quality of light absolutely steady, brighter and better in every way than that of gas, in a light that does not vitiate or heat the air, and is under perfect and instant control, and, withal, a light that dispenses with the constant menace with the asylum buildings of matches and an open flame. From incandescent electric lighting to gas would be a retrogression as positive and extended as from gas to kerosene, or from kerosene to tallow dips.

Proposals for electric lighting were opened, after advertising for six weeks, on June 24, 1885, and an award was made the following day to the Edison Company for Isolated Lighting, of New York City, in the sum of \$11,432.60, for which amount of money the Company agreed to instal 629 incandescent electric lamps, with the wiring therefor complete; to put in three dynamos—two having a capacity of two hundred and fifty lights each, and one a capacity of one hundred lights—and to furnish and place three Armington & Sims' engines, one for each dynamo. Final payment was made January 6, 1886, in the sum of the contract.

The main engines and dynamos are in duplicate, and damage to any one can stop or affect the light but for a moment. The same engines drive the machinery for laundry, carpenter shop and the ventilating fan.

The electroliers, pendants, brackets, and other electric light fixtures were purchased of Messrs. Bergmann & Co., of New York City, at a total cost of \$1,395.00.

Adding the cost of the fixtures to the amount of the Edison contract, and deducting the cost of one large and one small engine, which engines would have been required without the electric light, makes the total cost of the electric light plant \$11,032.27, which does not differ largely from the probable cost of piping the buildings for gas and erecting works for its manufacture.

As the construction of the building progressed in the various departments contracts were entered into or purchases made, of the apparatus, furniture or goods for which special appropriations had been granted, care being exercised to contract for or provide first those classes which would take the most time to produce. When goods were purchased in open market the method adopted was always a competitive one, the determination being made on the quality and cost of the goods offered as the interest of the State appeared. Whenever practicable the competition was based on definite specifications, as in the case of ward furniture, comfortables, hair mattresses, pillows, sheets, etc.; samples as a basis for contract being generally required. In many instances this method was not practicable, as in the better grades of furniture, miscellaneous dry goods and hardware, cutlery, pictures, tinware, brushes, clocks, musical and surgical instruments, etc., in all of which cases prominent firms were invited personally or by letter to name prices and to submit samples, or description of the goods offered. In a few cases in order to obtain the advantage of technical knowledge possessed by leading firms in

some specialty, as in fitting up the kitchens or laundry, proposals were asked simply for prices on a detailed outfit to cook or wash for a certain number of persons, leaving the kinds of goods, their arrangement and character to be determined by the firm making the proposal.

In the report of the Superintendent, under whose supervision all this work was placed, will be found specific information respecting the goods purchased, of whom, their character and cost, and accompanying this report is a complete list of all the principal proposals, giving the names of the competing firms, the number and kind of goods, prices named and result.

In no case was the opening of the building delayed because of goods unpurchased or undelivered, or because of work not started in time. One of the major contracts, the electric lighting contract, dragged alarmingly, but at the last minute squeezed through, to be in readiness with the rest. The sole aim was to so far perfect the building and its equipment that patients could be admitted, and thus relieve, at the earliest possible moment, the long continued demand for Asylum accommodation.

It will be seen that the summer and fall of 1885 were full of work. All branches of mechanical and artisan work were progressing simultaneously. The main contract, the large contracts for heating and for plumbing, fire protection and electric lighting, were going forward each in its varied branches and multitudinous details. All furniture and furnishing goods, a list running through nearly all branches of dry goods and hardware, were provided. The laundry, kitchens, and bakery were fitted with apparatus of the most approved and promising kind. The main sewer to Boardman river was constructed; a refrigerator and bakery building was erected; also a small barn for cattle, a swill-house and substantial pig-pens. Wagons, implements, utensils, horses and stock, were provided sufficient for immediate need. The deep well was commenced, completed, and equipped with a well house, pump and connections. An idea of the magnitude of operations crowded into a few months may be had by noting that the payments for the month of November 1885 were \$101,923.37, and those for September and December, each, over \$30,000.

Ground was broken in April 1883, and patients were admitted in November 1885. It will thus be seen that the admission of patients was almost simultaneous with closing the large contracts, all taking place in the month of November 1885, excepting only the contract for electric lighting, the closing of which was delayed until January following the opening of the Institution.

The building and its contents, together with the farm and stock, was formerly transferred from the Board of Commissioners to the Board of Trustees, the Board charged with permanent control of the Asylum, November 5, 1885, reserving, however, to the Commissioners all rights necessary to carrying on building and furnishing operations for the full completion of the Asylum.

But opening the Asylum by the reception of patients did not mean its completion. It meant that essentials had crowded out non-essentials. All could not be accomplished in so short a time. Thus the grounds, roads, barns, coal shed, and other outbuildings all were untouched. Books, pictures, musical and scientific instruments were unpurchased, as were also portions of the furnishing, the vehicles, utensils and stock. Even the main contracts for heating, plumbing and electric lighting were not finished and closed by final payment until after patients had been received. The payments for

December, following the reception of patients, aggregated \$30,907, and at the date of opening the Asylum there remained unexpended the sum of \$73,721.27, though quite a portion of this was required to meet obligations already incurred.

During the winter following the opening the steam and return mains and the hot and cold water pipes were covered; a large amount of interior work in the way of cupboards, shelving, chair rail, etc., was done, and nearly all the balance of the funds for furniture and furnishing was expended.

The principal work of the past season has been on the grounds, the roads, sidewalks, fences, and outbuildings. A brick and stone coal shed, having a capacity of one thousand tons, has been erected; also a general farm barn and a carriage barn, a large root cellar, or house, and some minor outbuildings. The dwelling house purchased with the site has been enlarged and appropriately fitted as a most desirable home, where fifteen selected female patients can live within their own family circle—a beginning of the cottage system. Two additional turrets, for ventilating purposes, have been built, and the ventilating system, heretofore incomplete, has been completed by finishing the work in the attics, and by the erection of a large and powerful ventilating fan having a maximum capacity of one hundred and twenty thousand cubic feet of air per minute. A large amount of work has been done upon the roofs, cornices and gutters, and within the attics, to remedy trouble experienced through climatic influences in the lodgment of snow and ice upon the roofs. These matters are all fully reported by the Superintendent and receive here only general mention.

The completed Asylum will accommodate five hundred and fifteen patients without crowding, and has been furnished for five hundred. The cost therefor on the basis of the money expended for all purposes, has been \$1,012.50 per patient. This per capita cost will in the near future be reduced through the crowding which will inevitably follow the pressure for admission consequent on the rapid growth of the insane population of the State—a growth considerably in excess of one hundred patients per year. At the date of this report 445 patients are under treatment, and of the estimated capacity only 70 vacancies remain, 50 females and 20 males.

Looking to the future the administration building has all the capacity and appointments demanded for the treatment of a thousand patients; the same is true of the chapel building, containing the chapel room, the kitchen department and the dormitories for help; also of the bakery and refrigerator building. In the shop building the boilers, pumps, engines, electric dynamos, steam and water mains, carpenter and laundry apparatus are worked far short of their full capacity, and the shop building itself is generally ample for largely increased use. Thus it will be readily seen that additional accommodation, for a few or for many, can, through the erection of detached buildings, be secured, and at a cost not to exceed \$200 per patient, reducing very largely the average cost.

APPROPRIATIONS AND EXPENDITURES.

The funds placed at the disposal of the Board aggregate \$521,700, of which \$400,000 was appropriated for purchases of land, the construction of the Asylum buildings, roads, fences, outbuildings and all incidental and accompanying expenses, and \$121,700 was appropriated for furnishing and equipping the Asylum. The specific purposes of the several appropriations

have been heretofore enumerated on pages 7 and 8. With economy throughout, and care to avoid any extravagant features, these sums have generally proved sufficient for the purposes intended. In a number of instances a larger amount could advantageously have been expended. On the other hand, in the heating fund, and in the fund for scientific instruments, small balances were left unexpended and were covered back to the State. The total amount expended for all purposes is \$522,430.68. This has constructed Asylum buildings plain but substantial, durable, nearly fire-proof, furnished and equipped with a view to economy, strength, and utility, and at the same time a due regard for appearance. The buildings have now been occupied for nearly a year, and the plan and appointments have, under test, proved well adapted for the purposes intended.

The money has been drawn from the State Treasurer monthly only so fast as needed for immediate expenditure, keeping the Asylum treasurer in a state of chronic poverty, intensified by the monthly remittances from the State Treasurer, sometimes elatingly large, but which came only to vanish. This method of drawing money was rendered possible by the promptitude with which requisitions were honored by the Auditor General. The expenditures are given in detail in the report of the Superintendent, and the main items only are here inserted:

GENERAL LEDGER.

Building appropriation.....	\$400,000 00
Special appropriations.....	121,700 00
Land.....	\$19,326 00
Architect.....	5,664 10
Incidentals.....	4,090 51
Salaries.....	14,518 25
Farm.....	280 27
Outbuildings.....	10,192 75
Contract for stone.....	4,738 76
Contract for brick.....	53,023 50
Contract for hauling stone.....	1,202 65
Contract for construction.....	262,249 21
Constructions outside of contract.....	10,733 44
Electric light.....	11,168 55
Fencing.....	835 29
Roads.....	1,621 06
Grading.....	511 19
Sidewalks.....	405 01
Furnishing wards, administration building and dormitories.....	30,375 00
Furnishing offices, chapel and dispensary.....	2,475 00
Cooking, laundry, baking, iron working and car- penter apparatus.....	7,660 00
Heating apparatus and power boilers.....	40,006 00
Plumbing, hot and cold water distribution and hot water boilers.....	13,375 00
Sewers, drains and cisterns.....	3,430 00
Implements, vehicles and utensils, stock and horses, engines, shafting, etc.....	7,340 00

Fire protection.....	\$4,115 00	
Ventilation, including fan and engine.....	3,570 00	
Grading.....	1,600 00	
Telephone communication, dumb waiters and Asylum bell.....	1,705 00	
Sidewalks and airing courts.....	1,260 00	
Scientific instruments, books, pictures, musical instruments, etc.....	1,778 82	
Supplying Asylum with water, including pump and well.....	2,750 00	
Returned to State treasury.....	260 18	
Totals.....	\$521,980 27	\$521,980 27

THE BOARD OF COMMISSIONERS.

During all the progress of the work the Board of Commissioners has remained as originally constituted with a single exception. Hon. Perry Hannah, after giving to the State, during the main construction of the building, the benefit of his ripe business experience and sound judgment, acting meantime as chairman of the Board, resigned his position November, 1885, immediately preceding his departure for Europe, to be absent several months. The vacancy thus created was filled without delay by the appointment of Thomas T. Bates, of Traverse City.

From the outset it has been the policy of the Board to meet monthly, and these frequent meetings, it is believed, have resulted advantageously, giving to the Board greater familiarity with the work, both in preparation and in execution, and keeping constantly in view the expenditures of the present and the liabilities to be incurred from the necessities of the future. The final meeting was held November 10, 1886.

In the counsels of the Board conclusions have been reached with great unanimity. Harmony has prevailed almost as of one mind, and the past sessions of the Board will be remembered with pleasure. In the determination of methods to be adopted by the Board or the persons to be benefited through the expenditure of public funds, personal or party considerations or the entanglements of political bias, and the dissensions arising therefrom, have never found a place.

We cannot close this report without recognizing the great service rendered us by Mr. C. M. Wells, our Superintendent and Secretary. No part of the business, either in the construction of the building or the vast amount of detail necessary in heating, lighting and furnishing it, has escaped his care and attention; and the Board is largely indebted to him and his great and diversified experience for the thorough and complete manner in which the work has been accomplished, and is now turned over to the State.

THOS. T. BATES,
ALEXANDER CHAPOTON, SR.,
E. H. VAN DEUSEN, M. D.,
H. H. RILEY,
M. H. BUTLER,

Board of Commissioners.

SUPERINTENDENT'S REPORT.

To the Board of Commissioners Northern Michigan Asylum :

GENTLEMEN—In accordance with the requirement of general law I herewith submit my report of building operations and the disbursements therefor in the construction of the Northern Michigan Asylum. The period embraced by this report is from October 1, 1884,—the date of the preceding report,—to November 10, 1886. As a final report, however, it will be more comprehensive and satisfactory to cover generally the work and finances from the outset, since in a large degree the matter herein will be descriptive of the characteristic features of the various portions of the building or of the appliances, apparatus, machinery, or furnishing placed therein; a description that cannot be given intelligently in part, as of the heating apparatus, the plumbing, the electric lighting, etc. At the same time it will assist materially in arriving at just conclusions to accompany the descriptions of the many diverse and complex purposes to which funds have been applied, with tabular statements of expenditures, showing the amounts of money so expended, classified and divided as minutely as practicable; that is to show together results attained and cost thereof. A connected history with dates, etc., in detail, is not desirable, and would cumber a report already, perhaps, too much extended. There is, however, a reason which may be regarded as sufficient for giving costs considerably in detail, and important facts, methods and conclusions at some length, in that the report furnishes a mass of information readily available which experience shows is of value as a readily accessible reference for the Asylum itself, and as a comparison or instruction to other institutions and to the public. Dry unadorned facts do not make interesting reading matter; still it will be very satisfactory to the Asylum administration of the future to know the details, facts and reasons of the past; as, for instance, the numbers and costs of chapel seats without counting and searching vouchers; the cubic space heated and amount of radiating surface used therefor without several days taking measurements and computing results; the depth of the deep well, diameter, cost, etc., without reference to the scattered or destroyed original records or memoranda. It is, therefore, the design to deal with expenditures and results attained therefrom, taking up the several purposes to which funds have been applied, and making each complete in itself, *i. e.*, a financial analysis and a descriptive review.

The \$400,000 appropriated for the purchase of the site, construction of the asylum, complete, with roads, fences and outbuildings, together with all incidental expenses, has proved sufficient to finish all the work laid out, in addition to constructing a building for bakery and refrigerator purposes,

not originally designed, and to enlarge and fit for occupancy of patients a dwelling-house purchased with the Asylum site. It must not be supposed that a greater sum of money could not have been expended judiciously and with advantage to the insane population of the State:—in larger buildings and in groups of detached cottages, both of which will soon be demanded. It is meant that the Asylum buildings are practically completed in all essentials, so that varied classes of insane patients can be satisfactorily sheltered and treated therein, and that little expenditure for additions or changes in the near future need be apprehended.

The sum of \$121,700 appropriated for furnishing the Asylum and equipping it with apparatus, stock, machinery, etc., was divided by the act among fourteen distinct appropriations, and the funds were not interchangeable, *i. e.*, a balance in one appropriation could not be used to supply a deficiency in another; nevertheless the estimates had been so carefully and closely made that no especial trouble was experienced, the funds generally proving sufficient to accomplish in a substantial manner the intended purpose. The fund for stock, horses, and vehicles, could profitably have been somewhat larger, as could also that for apparatus for kitchens, laundry, bakery, etc. On the other hand, a small sum \$21.18 remained unexpended in the fund for scientific instruments, and \$239 in the fund for heating apparatus, which sums were covered back into the State treasury.

The total expended, \$522,430.68 will provide for 515 patients, and by a process of crowding, sure to come in the history of every asylum as soon as the normal capacity is all taken, many more will be accommodated.

It has been the end throughout to study and practice the closest and broadest economy; economy in price through competition, economy in durability through quality and construction, and economy in adaptation through selection of the best methods, the most approved appliances and of articles to fit their use. In all advertised contracts the original proposals are deposited with the Secretary of State at Lansing. In all contracts and purchases for which proposals were not invited by advertisement it has been the invariable practice to take written offers from more than one party, whether the amount be large or of but a few dollars, to fasten the proposals of each competition together, and to file each set under the name of the firm securing the order. This furnishes at once a written record of the past to gratify a curiosity or supply information and a protection to the party responsible for the award. The main competitions accompany this report, giving names, prices, goods and results, not as a part thereof but for publication therewith, and will prove hereafter of value for reference.

Of the contracts it is sufficient to say that the contracting firms have been responsible and energetic, possessing both experience and technical knowledge of the various specialties. Contracts have been pushed through rapidly, the work has been satisfactory, and extras on contracts were incurred only for a few instances in trifling sums, while on the main contract \$9,920.46 less than the contract price was paid.

The Asylum was opened before it was finished. In both construction and equipment much remained incomplete at the date patients were first admitted. The necessity for additional accommodation was great. The existing asylums had long been refusing admission except in most urgent cases. To have delayed the opening for the full completion, or even for a near completion, would have excluded patients many months. It would

have been the easier course, far easier. It would have avoided the crowded and hurried work of the months preceding the opening, when so much was pressed forward simultaneously. It would have saved the care and anxiety lest something should be behind or omitted that would delay the opening; the constant watchfulness to start every essential branch of work or equipment to make all come out together, and a continual looking into the future to determine, as all could not be done, what could best be left undone. Patients were admitted in November, 1885. Prior to November none of the large contracts were closed, and in that month the larger portion of the furnishing came in. Nothing essential was behind so as to delay, though the full building could not have been at once occupied. It is a satisfaction to know that the ends of humanity were attained, even though the query should be raised why the work was not closed with the admission of patients.

A number of advantages have resulted in completing the work during the occupancy of the building. Defects and omissions have become apparent when such existed, and have been remedied or supplied; the skilled knowledge and advice of a Medical Superintendent has been always available in adapting the work in progress to the necessities of an Asylum; the work has not been done hurriedly and under pressure, and therefore without due consideration, and considerable labor in the expenditure of the building fund has been performed by patients.

LAND.

Land, \$19,326. This is the expense incurred by the Locating Board in the original purchase of land, 339.90 acres, together with the buildings thereon, an average of \$56.86 per acre.

CONTRACT FOR STONE.

This contract, with Messrs. Wing, Morgan and Harford, was closed at the time of the previous report. It included:

107.69 cords of footing stone, at \$16.....	\$1,723 04
251.31 cords of rubble stone, at \$12.....	3,015 72
Total	<u>\$4,738 76</u>

CONTRACT FOR HAULING STONE.

This contract, reported in the previous biennial period, was let to Messrs. Farr and Avery, as the lowest bidder, who moved the footing and rubble stone, delivered by Messrs. Wing, Morgan & Harford, from the dock at Traverse City to the Asylum ground at \$3.35 per cord. Total, \$1,202.65.

CONTRACT FOR BRICK.

This contract, with Farr, Avery & Co., was closed and commented on at the date of the preceding biennial report. It includes:

7,987,000 brick, delivered, at \$6 per thousand.....	\$47,922 00
340,100 pressed brick, delivered, at \$15 per thousand.....	5,101 50
Total	<u>\$53,023 50</u>

In addition to these brick delivered under contract the Asylum has since purchased of J. W. Markham considerable brick made near the yard of Farr, Avery & Co., and at the same rates, \$6 per thousand, delivered, to be used for various purposes of construction, such as deep well, well-house, bakery and refrigerator building, and other out-buildings and trunk flues. In contract work there has been used in the coal shed, etc., 60,000 brick, making the total number of brick which entered into the construction of the Asylum building, complete, 8,666,300.

CONTRACT FOR CONSTRUCTION.

This contract, with Messrs. Bentleys & Nowlan, detailed in the preceding report, embraced the general construction of the Asylum buildings, and included all branches of artisan work, such as mason work, carpenter work, iron work, tin work, slating, painting and oiling. From this contract, however, was excluded the furnishing of the brick and a portion of the stone. The work was pushed with great vigor and sound judgment, the contractors taking advantage of the markets to provide materials in advance of their necessities. The contract was in the sum of \$272,169.67. Changes in the contract by additions and deductions were made as hereinafter shown in detail, the deductions amounting to \$16,037.41, and the additions to \$6,116.95, leaving a total paid to Messrs. Bentleys and Nowlan of \$262,249.21, as follows:

Excavation.....	\$1,983 20
Brick work.....	77,830 68
Stone and footings.....	16,477 84
Cut stone.....	18,950 38
Crock pipe and tile.....	482 50
Plastering	13,740 30
Deafening	529 98
Marble and slate tile.....	907 48
Cast iron work.....	11,905 23
Wrought iron work.....	2,713 26
Galvanized iron work.....	15,790 34
Carpenter work	72,009 17
Slating, tin and lead work.....	4,864 70
Painting and oiling.....	8,947 20
Insurance and incidentals.....	9,000 00
Additions.....	6,116 95
Total under contract with Bentleys & Nowlan.....	<u>\$262,249 21</u>

Messrs. Bentleys & Nowlan, as required, submitted with their proposition for the construction of the Asylum a schedule of prices and quantities,

which multiplied together and added made the sum total named in their contract. Any changes made subsequent to entering into the contract, by which portions of the material or labor named in the schedule were omitted, were grouped together and classed under the title "Deductions;" and any additions of work or materials to the quantities named in the schedule in the same manner were classed as "Additions." Under the contract the right existed to make these changes at schedule rates whenever the schedule prices would apply thereto. In all cases where a schedule price would not apply the changes were made subject to special written agreements. The deductions, in detail, are as follows:

DEDUCTIONS FROM CONTRACT OF BENTLEYS & NOWLAN.

Excavation.....	\$353 00
Brick work.....	540 00
Rubble stone and footing stone.....	5,372 65
Crock pipe and tile.....	971 50
Plastering.....	5,995 88
Mantels and grates.....	600 00
Cast iron work.....	467 09
Galvanized iron work.....	300 00
Carpenter work.....	864 49
Painting and oiling.....	572 80
Total.....	<u>\$16,037 41</u>

Some of these deductions require a word of explanation. The ground upon which the Asylum is placed has proved a most excellent soil for foundations, a firm, clean sand and gravel, which, after the removal of the top soil, was suitable in most places to receive the footing stones of the foundation. The depth to which it would be necessary to carry the trenches could not be accurately determined at the time the plans were prepared, owing to the uneven surface of the building plat and uncertainties as to the character of the soil. The contract, therefore, provided against possible contingencies by giving to the Superintendent discretion as to the full or partial execution of the foundation work as shown by the plans. It was found possible to materially reduce the depth of these foundations, and thus effect a large saving in stone and excavation without diminishing in any degree the strength of any wall, as is attested by the fact that as yet no crack from settlement or otherwise has made its appearance.

The contract provided that all ceilings shall be lathed with wire cloth No. 16, four wires to the inch. A large saving was effected by changing this to No. 18 wire, three wires to the inch, which was believed to be in accordance with the best usage of the present time.

The brick deducted represent an unconstructed portion of the brick conduit for the creek which crosses beneath the foundations of the building, an open creek being substituted for the portion omitted. The original construction of this conduit in addition to being shortened was changed by enlargement, and by the substitution of stone work at each end. The item, therefore, appears both as a deduction and as an extra.

The \$600 deducted, because of mantels and grates, represents an omission

from the contract of Bentleys & Nowlan, which by agreement were furnished directly by the State at the same cost. These mantels are placed within the Administration building, one each in the following places: Trustees' room, Medical office, Steward's office, dining room first floor, parlor second floor, sitting room second floor, dining room second floor, and bed room second floor—eight in all.

The crock pipe and tile deducted, and all of the cast iron work deducted, excepting \$106.89, is because of a change by agreement, omitting all sewer work from the contract of Bentleys & Nowlan. The iron pipe work was subsequently included in the contract for plumbing, and the crock pipe work was done with the other sewer work. Of the total deducted because of cast iron work omitted, \$106.89, was because of a decreased number of register frames and faces for hot air flues.

The original contract provided for all gutters to be made of galvanized iron. It was believed that a tin gutter in this climate, with the severe strain upon the gutters from thawing and freezing of ice would be more durable, and a change to xx tin was agreed upon, at a net saving of \$300.00. This change did not apply to the shop and chapel buildings, where the galvanized iron has proved less serviceable than the tin.

The deduction under the head of carpenter work is because of a number of changes. The wood work of baths, sinks and water closets was omitted at a reduction of \$420.00 and this work, to the very limited amount that was used in connection with these fixtures, was included in the plumbing contract. \$279.68 was deducted because of the omission of all wood skirting and wainscoting on the kitchen floor of the chapel building; a skirting of cement, affording no lodgment for vermin or dirt, being substituted therefor, the cost of which appears as an extra. The remaining portion of the reduction is made up of a number of minor changes.

An agreement was effected with Messrs. Bentleys & Nowlan, omitting from the hard maple floors one of the two coats of oil called for, making a deduction of \$572.80, and this work of oiling was changed to a Crocket finish, in cost as hereinafter shown.

ADDITIONS TO CONTRACT OF BENTLEYS & NOWLAN.

A number of the items which appear with the additions represent a changed construction rather than an extra, showing also in the deductions. The items for the most part are self-explanatory; where this is not the case remarks will follow.

ADDITIONS TO CONTRACT OF BENTLEYS AND NOWLAN.

Enlargement of creek conduit	\$516 40
8 elbow pipe castings for sewer connections	66 96
Striking joints on 655,000 brick in plenums of basements	196 50
Extra for beveling edges of iron sash	146 30
Net extra cost of changed brick work	417 89
Foundation for stair wells, changed from wood work to mason work	70 13
29 feet of cut stone, belt course added to front tower	40 02
209 feet 4-inch tile, laid beneath air ducts	31 35
2 dormer windows, added to rear of administration building	50 00

11,996 feet of ceiling joist, added in administration building-----	\$239 92
Raising ceilings in three laundry rooms and shops-----	18 00
Cutting window frames to admit a special sash weight-----	18 75
18,895 square yards of concrete for basement floors-----	755 80
8184 3-4 square yards of brick paving in basements, changed to concrete-----	220 99
4 skylights, for lighting air ducts-----	148 00
8 iron doors for fire proofing stairways at entrance to attics.	107 52
9 iron covers and gratings for sewer heads-----	101 25
Net addition for rough lumber and nails, because of minor changes in roofs-----	64 00
10 attic doors and frames for pipe shafts-----	35 00
Jack roof of centre tower, changed from ridge to deck-----	30 00
Widening two archways in food car passage-----	12 00
8,833 square yards of deafening, changed from mortar gauged with calcined plaster to all calcined plaster mortar-----	706 64
830 square yards of plastering on wire cloth in basements over food car tracks, added-----	448 20
Stair strings in wards, changed from pine to ash-----	92 00
1,821 yards of plastering in basement plenums, changed from 1 to 2 coat work-----	91 05
2,308 yards of plastering in fourth story of administration build- ing and in chapel room, changed from two to three coat work	115 40
4,750 square feet of floor in water closets, bath rooms and lava- tories of wards, changed from maple to ash-----	76 00
Net extra on numerous doors and windows, added or omitted....	416 98
Stops of 716 windows of wards, screwed instead of nailed-----	60 86
861 square feet of flagging in laundry, laid on concrete rather than on sand-----	34 64
Modifying closet in administration building to make a room for Central Telephone Exchange-----	15 00
Galvanized iron louvres, added in upper openings of main tower for purposes of ventilation-----	55 93
Tinning administration roof between main tower and pediments.	4 00
Band moulding added to windows of third story wards-----	110 92
Stairs first story of chapel building, changed from platform to winders-----	10 00
548 1-2 lineal feet of base in kitchens, changed from wood to cement-----	54 85
139 1-2 square yards of wainscoting in kitchens, changed from wood to cement-----	104 33
Wainscoting added to main stairway above the first story-----	22 60
2 rear porches added-----	159 18
2 flights of stairways added to attics and 1 flight omitted in boiler room, net-----	41 99
Wainscot added to chapel stage-----	17 20
Net extra on changes of base-----	23 75
Net extra on closets, dumb waiters, shafts, etc-----	11 58
Transom over main entrance double door, changed from double thick to plate glass-----	14 64
Hauling and handling iron sash-----	12 00

Changing latches on iron doors	\$11 25
Filling for boiler room floor.....	10 80
Net extra because of area space, flagging, door sill, etc., for extra door at north side of chapel building.....	68 12
Changing stair partition and adding wire cloth in chapel building	20 88
Plugging walls for angle beads in administration buildings.....	2 75
Raising platform of central building stairs.....	2 75
Cutting walls for centre basement stairs.....	1 88
Changing two window sash fourth story administration building.	7 60
Cutting walls and ceilings fourth story administration building to admit water tank.....	4 40
<hr/>	
Total additions because of changes in contract with Bentleys & Nowlan	\$6,116 95
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It will be seen from the foregoing that the accounts were kept in great detail; even more so than appears by the table, because the number of the changes therein named, as in brick work, plastering, carpenter work, windows, doors, etc., are the net result of a large number of changes of more or less importance. It is impracticable in a large work of this kind to foresee and provide for the best construction in all its details, and it is quite usual where changes are made during the progress of the work to offset an omission against an addition, making no account of either. This method was not followed here, and the showing is large; whereas the general plans and specifications were adhered to quite closely throughout.

The creek conduit passes through the foundations of the building, and was shortened and enlarged from 12x18 inches to 18x27 inches, as stated under "Deductions."

The iron sash were made for Bentleys & Nowlan by Messrs. Thirlby, Jackson & Co., of Traverse City, and excellent work was done. These iron sash are let into a rabbet in the exterior wooden sash, and on the room side have a lip which covers the wood sash, thus precluding the possibility of air entering between the wood and the iron. It was the work of beveling and straightening this lip with an emery grinder, for which an extra was paid.

The largest item, because of the extra brick work, arose through the change of ward and shop stairs from open strings to closed strings to prevent possible suicides by patients, necessitating brick work for stair walls and partitions. Another large item of extra was incurred in enclosing the stairs leading to the attics within brick walls, so that by placing iron doors at the foot of these stairs a fire-proof construction was made.

The general method of deafening, in addition to the usual mortar deafening which is more for fire protection, is by introducing two sets of joists, the upper set carrying the floor and the lower set the ceiling. The two sets are entirely disconnected, and vibrations of sound are not communicated through the dead air space between the two sets. This construction was added to the administration building as an extra.

It will be noted that \$54.85 was paid for cement base and \$104.33 for cement wainscoting, all within the kitchen floor of the chapel building and basement of the administration building. The total deduction because of wood wainscoting and base omitted in these departments was \$278.68, showing a net saving of \$120.70, and the cement allows no lodgment for water bugs, other vermin or dirt.

The floors of lavatories, bath-rooms, etc., are frequently wet, and ash floor will prove more durable therein than maple.

The window stops of wards were screwed to the frames to prevent possible-removal by patients.

The rear porches over entrances were necessitated by the danger of snow slides from the roofs.

DESCRIPTION OF THE BUILDING.

A description of the work done under contract with Messrs. Bentleys & Nowlan would embrace the main features of the building in their adaptation to the various needs and uses of an Asylum. Space will not permit more than a general outline of the nature and character of this work, together with the mention of certain points of construction, interesting because of special or new adaptation to effect a desired result. Preceding the title page of the report will be found a ground plan of the first story of the building throughout, lettered, to designate the various uses to which the divisions and apartments are applied; also a lithographic view of the front of the building.

The general division, as shown by the ground plan, is into administration building, wards for males, wards for females, chapel building and shop buildings.

The center or administration building is used for administrative purposes, and is occupied by the officers of the Institution for offices, living rooms, etc. The offices occupy the first story, and comprise the general medical office, Medical Superintendent's office, Trustees' parlor, Steward's office, Matron's room, two reception rooms and a dining room. In the basement of the administration building is located the dispensary, the special kitchen and the rooms for the Storekeeper and his goods.

The first story of the chapel building is occupied throughout as a general kitchen, and here is prepared the food for the entire Institution, except that for the administration building and for special or extra diet for patients. This kitchen floor is divided into eleven rooms, including temporary store room, sink room, steaming room, room for preparation of vegetables, almost wholly done by the patients, and a dining room for employés. Above the kitchen, with a double deafening in the floor between, is the chapel room, having 318 seatings. This room is also used for amusement purposes—concerts, socials, dances, etc. The second and third stories of the chapel building, at the rear, are used as dormitories for employés.

The shop building contains, centrally, the boiler room, engine room and fan tower; south of and adjoining these are the carpenter and blacksmith shops, and north the various rooms used for laundry purposes—receiving room, washing and drying room, ironing rooms, assorting and delivery room. In the second story of the shop building are a number of bed rooms or dormitories for employés.

The bakery and refrigerator building is placed contiguous to the kitchen upon the south side, and is used for the purposes indicated by the name. Between the kitchen and the bakery building the ground or driveway has been paved throughout with an artificial stone of Portland cement. Thus it is impossible for slops and refuse to be absorbed by the ground and become offensive or dangerous.

There are nine wards for males and an equal number for females, three wards for each sex upon each floor, and the cottage forms a further ward for

fifteen females. The number of patients that each ward will comfortably accommodate is fairly shown by the following table:

Stories.	Wards Nearest Centre.	Inter- mediate Wards.	Extreme Wards.	Total North Wing.	Total South Wing.	Total of Building.
First Story.....	33	28	16	77	77	154
Second Story.....	43	33	16	92	92	184
Third Story.....	43	22	16	81	81	162
Cottage.....						15
Total.....	119	83	48	250	250	515

It is doubtless the case that in the near future the history of the older Asylums will be repeated by crowding this Asylum beyond the capacity above named. The insane population of the State is increasing at a rate exceeding one hundred per year, and possibly as high as one hundred and fifty per year, and the Asylums even now are nearly full. In this connection it is proper to re-state from previous reports, and thus make more prominent, the fact that the asylum buildings as now constructed were originally designed and considered but as a centre to a larger system which shall embrace a series of detached cottages. These cottages can be constructed at a cost per capita far below that necessitated in the centre structure, and within them certain classes of the chronic insane can be comfortably and more economically maintained. In designing the administration and working departments this possible extension was kept in view, and these departments are believed to be ample in size and equipment to the future demands above outlined. It was not possible, however, with the funds appropriated to erect the central structure and the detached buildings also. In the treatment of the insane in very many cases the best results cannot be obtained except through segregation of the patients—individual rooms for individual cases. These rooms must be built in brick all round, both because of the fire risk and because of durability. The fire risk is great, as is witnessed by the large number of Asylums that have burned, and this risk must be reduced in every possible way, even at the expense of cost; and the experience of the country throughout shows that Asylums for the insane, even where not well protected against fire, have been obtained only through the expenditure of large sums of money.

In designing the ground plan, after considering the special requirements of classification and division into apartments for the varied uses of the insane, two fundamental ideas were kept prominently in view: First, by an arrangement of longitudinal and transverse divisions to so arrange that all portions of the building shall receive at all times a direct supply of light and sunshine and exposure to the outer air, allowing no enclosed courts, skylights or interior rooms. This object was attained in such a manner that each room and hall of the entire wards and administration building has a window opening directly to the outer air. Second, to so arrange the ground plan that noise or confusion of any ward may not disturb any other ward. To this end it will be seen that the ground plan stretches out in length rather than returning upon itself to form angles, across which patients in different divisions would be able to annoy each other. The wards for disturbed patients are placed at the extremes of the building, and any noise

therefrom must pass endwise over the other divisions in order to be heard. It will be noted also that the administration building is so designed and placed that privacy from the wards is secured within every room—a very desirable feature.

A basement having 8 feet 6 inches clear height, of which five feet is above the surface of the ground, is excavated beneath all portions of the administration building and wings. The centre portion of this basement is occupied by the mains and radiators of the heating apparatus, and by numerous pipes in a plumbing system, and is designated as the plenums, for the reason that the air therein while passing to and over the radiators to the numerous hot air flues air is kept in a plenum condition by the pressure of the ventilating fan. That part of the basement which is beneath the rear rooms is occupied by a food car track, upon which in cars, built for the purpose, food is distributed from the general kitchen to the eighteen dining rooms of the wards. The basement also furnishes a large number of rooms for stores and storage, and has some rooms unoccupied. All occupied parts of the basement have received a heavy floor of concrete, finished on the top surface with a rich coating of cement mortar. This concrete is rat proof, is easily kept clean and sweet, and in a measure acts as a barrier against the free inhalation and exhalation of air from the ground of the basement, which air through the ventilating system would diffuse itself throughout the entire building. Care has been taken to thoroughly light all portions of the basement, and the sandy, gravelly soil, light and porous, together with the elevation of the building, renders all portions of the basement dry.

Each wing is divided into nine wards accommodating, nominally, from sixteen to forty-three patients each, together with the necessary attendants, and each ward is complete in itself for all living purposes, being provided with a dining room, a lavatory, a bath-room, a clothes-room and closets. In general the rooms for patients are situated on either side of the central hall or corridor, these corridors being twelve feet wide, and the patients' rooms varying in size from eight feet six inches by eleven feet, to fifteen feet by eleven feet. With each ward, except the extreme wards, there are two large rooms occupied as a parlor and a dormitory, or as two associate dormitories, varying with the classification of the patients and the necessities of the population. The building is designed so as to furnish to the patients generally individual rooms. Many of the rooms are large enough to receive two, three, or more patients. Indeed, if the ventilation proves to be as ample as is expected, the single rooms can safely accommodate each two patients, selected with reference to harmony and safety. For no evil effect from overcrowding, and consequently bad ventilation need be anticipated so long as a continuous current of fresh air is entering the rooms, passing over the occupants and escaping as soon as vitiated. That is, adequate ventilation depends more on quantity of air than on cubic feet of space. A desirable feature in the arrangement is the large bays which serve as day rooms, and here patients sit much of their time while within doors.

All interior walls without exception are of brick, no wood partitions being allowed, and the plastering is placed directly on the brick walls, except the plastering of the ceilings, which is on wire cloth.

The break in the axis of the buildings, throwing the wings forward, will be remarked. This was done for the dual purpose of accommodating the building plan to the surface of the ground and to give each ward a view of Grand Traverse Bay.

To obviate the necessity of carrying sweepings from the building, shafts were constructed, into which sweepings are dropped and fall to the basement and are periodically removed. In the same manner soiled clothes are thrown within shafts and removed to the laundry from the basement.

Brick shafts are constructed for the sole purpose of receiving soil and water pipes, so that these pipes may be at all times accessible for examination or repairs, and about these shafts are grouped the bath rooms, lavatories and closets. There are also numerous drying shafts having slat floors, in which a current of air is passed from the basement through the roof, and within which are dried dish towels, etc., the odors from which should be immediately removed from the building. In like manner there are ventilated closets for boots and shoes, mops, pails, brooms, etc.

All shafts and stairways are closed at the top, either with brick arches or with heavy calcined-plaster mortar four inches thick, within which battens are bedded for support. Shafts used for drying purposes have wire cloth built into the brick work to allow the passage of air.

Mortise dead locks without catches are used throughout the wards. The doors to patients' rooms have knobs upon the corridor side only, the shank of the knob being let into the door and fastened from the room side with a nut on the shank. This is then concealed by a button of wood let into the door and glued in.

Iron sash, in form and color resembling wood sash, are used for the ward windows. These iron sash are not removable, therefore for purposes of ventilation a wood sash is placed inside the lower half of the iron sash, which wooden sash is glazed, and can be raised, while the lower half of the iron sash is unglazed. The wooden sash is double hung with weights, the cord being attached to the bottom of the sash, passing over pulleys below the top of the wooden sash so that the cord is invisible, and cannot be removed by patients for purposes of self-destruction.

Transoms are placed over the ward doors, in part of iron and in part of wood. They aid materially in lighting the corridors, and through an unglazed portion of the sash at its top the warm air passes from the corridors for heating and ventilating the rooms. These sash are removable from the corridor side only, to provide against the possible contingency of a door barricaded by a patient.

Windows are not cased, and the doors are cased with narrow band moulding on the room side only. To take the place of the wood casing the corners of the brick walls are clipped and the plastering is rounded in with a radius of $3\frac{1}{2}$ inches to meet the door and window frames. This construction is much cheaper, reduces the amount of wood work and the liability to fire, gives much less wood to be kept clean and painted, and, withal, presents a very neat appearance.

All floors are laid double with a deafening and fire protection course between the floors, consisting of $1\frac{1}{2}$ inches of solid calcined plaster mortar.

All ceilings are plastered upon wire cloth, supported, except in the upper stories, by a set of ceiling joists, separate and distinct from the set of joists which carry the floor. This deafening is very perfect and the barrier to fire good. The upper floor throughout is of hard maple, except in the lavatories, bath-rooms, and closets, which are frequently wet and where ash was used.

Lavatories, bath-rooms, and water-closets, and all stairways are wainscoted in ash, filled and varnished. The finish of the first story of the administra-

tion building and of the chapel room is of cherry; second and third stories of administration building of pine in the natural wood; elsewhere throughout the finish is of pine painted.

A very excellent quality of plastering in hard finish was secured. The sand found upon the building site was remarkably good, the lime did not pop and the contractors did a most workmanlike and creditable job.

The front of the building is laid with a fine quality of light colored pressed brick, furnished under the contract of Farr, Avery & Co., by J. W. Markham, of Traverse City. This front is relieved by sandstone trimmings from the Berea, Ohio, quarries, worked into window caps, sills, belt and string courses, corbels, etc. The basement wall between the water table and plinth course is laid with six inches of rock-faced ashlar in courses, made also from Berea stone.

The cornices and brackets thereto are of galvanized iron sanded. The roof is covered with a most excellent quality of black slate, furnished from Michigan quarries in the Northern Peninsula.

The building throughout is heated with steam, and lighted with incandescent electric light, as described under the appropriate heads.

Messrs. Bentleys & Nowlan pursued the plan of doing their own work rather than sub-letting; they, however, sub-let the galvanized iron work and tin work to Leadley & Hutton, of Detroit, who did their work thoroughly and satisfactorily; and the wood work, of doors, door frames, window frames, sash, blinds, base and wainscoting was furnished and prepared, but not put in place, by J. E. Greilick, of Traverse City, of whose work only words of commendation in the highest degree can be spoken. The ironwork also, both cast and wrought, was furnished through Greenslade Bros., of Milwaukee, Wis., except that the iron sash were furnished, as before stated, by Thirlby, Jackson & Co., of Traverse City.

CONSTRUCTION OUTSIDE OF CONTRACT.

Under this general title is grouped a large number of expenditures for construction in very diverse branches. The items will be given, after which any necessary remarks of explanation will be made:

400 wood frames for ventilating flues	\$100 00
528 iron faces for ventilating flues	206 70
Tinning 18 doors for fire protection	55 80
“ 29 “ “ “	290 00
Labor and material for well	893 87
Brick for refrigerator, bakery, etc.	672 90
Cement for walks, lime, etc.	290 32
Plaster for attics	50 22
Cement walk	105 00
Plastering centre basement	58 00
Ceiling in carpenter shop	74 75
Lumber	108 57
Oiling and varnishing floors	677 74
Locks, knobs, and hinges	2554 14
Tables, shelving and cupboards	76 31
Chair rail	656 09
Mantels and grates	600 00

Lightning rod on main stack.....	\$63 90
Hot air and ventilating flue frames.....	323 57
Fire proof vault.....	133 43
Stairs to basement.....	32 25
Doors and windows.....	14 75
Tinning and protecting roofs.....	766 27
Miscellaneous hardware.....	309 02
Slate.....	180 25
Additions to plumbing.....	41 71
Painting.....	48 87
Miscellaneous and labor.....	1,124 01
Frescoing chapel room.....	225 00
Total.....	<u>\$10,733 44</u>

The contract of Bentleys & Nowlan provided for oiling all floors two coats. It was found that this would not make a satisfactory finish, and an agreement was made taking the last coat of oiling out of their contract. The floors of the rooms are finished with Crocket wood preservative, which finishes the maple floors with a high polish and wears well. A more durable finish, however, and cheaper, oil with wax, is used for the halls of the male wards.

Locks, knobs and hinges were placed under contract with J. B. Schroder, & Co., of Cincinnati, as fully reported for the previous biennial period. It is sufficient to say that these locks have proved eminently satisfactory, and have a great convenience in the master key for the officers, which operates twenty different sets of locks.

Use demonstrated the necessity of placing a chair rail generally to protect the walls of the corridors from abrasion by the backs of chairs used therein. Heretofore in Asylum equipment it has been the practice to furnish for ward use heavy settees to be screwed to the floors. Instead of these settees strong chairs and rockers of ordinary make have been used throughout; hence the necessity for the chair rail, which is of hard wood with varnish finish, and adds somewhat to the appearance of the wards.

The stairs to basement were put in to allow access of patients to basement rooms fitted for storage of boots and shoes. Slippers are worn within doors and the boots and shoes outside.

The vault was constructed by placing double vault doors, in two sets, made by Mosler, Bahmann & Co., of Cincinnati, Ohio, in the opening to a small closet adjoining the Steward's office. Heavy masonry arches were turned at the ceiling and at the floor of this closet, and on one side the brick wall was reinforced by four inches additional brick work.

The work on roofs shows as a large item, which requires a word.* The winter climate is very conducive to the production of ice within the gutters of buildings, gradually accumulating and backing up upon the roofs, and depending in long icicles over the gutters. The cause of this accumulation of ice may be found in the very frequent snows of the region. This snow melts on the upper portion of the roofs, which are warmed from the interior hot air, runs down to the lower portions of the roof which are cold, because unheated, and there freezes and accumulates, as before stated. During the warm days or the warm portion of a day this ice melts at its upper contact

with the roof, but remains solid at the eaves, thus forming a pocket, holding water, which backs up under the slate and enters the building. In addition the heavy weight of ice with the frequent expansion and contraction owing to thawing and re-freezing is constantly making leaks in the gutters. Considerable trouble was experienced during the past winter because of the conditions as stated. Neither is it easy to obviate the trouble.

After careful consideration an effort has been made to keep the roofs throughout cold, i.e., top and bottom, inside and outside alike, by introducing outside air into the attics, and thus reduce the amount of ice produced, and to allow it to remain as ice or snow when once formed. To keep the attics cold openings have been made through the lower side of the galvanized iron cornice between each set of rafters. These openings admit air directly over the plates on top of the walls to the attics. To maintain a circulation of this cold air small openings have been made in very many places through the roof in the form of miniature dormer windows. To prevent an interchange of heat and cold between the cold attics and the warm story below, the attic floors have received a coat of solid calcined plaster mortar, varied in thickness from one inch to one and one-half inches, in accordance with the weight which the ceiling joist can properly sustain. This coat of mortar is also very valuable as a fire protection, as it will prove a barrier to fire from the upper stories passing to the attics, or vice versa.

But reliance has not been placed on the above method alone. Tin has been substituted for slate in all the valleys, and on pediments where the greatest trouble was experienced. For this purpose twenty-eight squares of tin have been laid. The gutters of the chapel building, which are of galvanized iron, have been reduced in depth to one inch by cutting away the upper member of the cornice. The chapel attics have been cooled, as previously described for the wards, and a drip has been arranged in such a manner that if a leak at any time occurs the water will be carried outside the walls.

The leaks which had occurred within the chapel room rendered it absolutely necessary to color the walls. This coloring alone would have cost not less than \$125.00. An arrangement was made with Mr. Frank W. Kiesele, of Kalamazoo, to fresco the entire chapel room and stage at the rear, which work has been done at a cost of \$225.00, and it is a pleasure and justice to say that the artist has produced a work which is exceptional in taste and color.

SEWERS, DRAINS, AND CISTERNS.

The sewerage of the Asylum empties into the Boardman river through a six-inch crock pipe sewer, having from the junction in front of the building a total length of seven thousand feet, and a fall of sixty-two feet from the Institution to the river. The total cost of this main sewer was \$1,500, and the least grade is six inches per hundred feet. The sufficiency of a small sewer for all the purposes of an Institution of this character, indeed its superiority, has been so fully and frequently demonstrated that its merits require no explanation or championship here.

Near the Institution the main sewer branches, to reach the various outlets from the building, and each branch before it enters the building is ventilated with iron pipe extending six feet above the roof of the building. A portion of the storm water which falls upon the roof is delivered into the sewers, sufficient to flush each branch. In some cases where the six-inch branch

would not provide for carrying away this storm water the branch has been enlarged to eight and nine inches, and after the branches are all united, the sewer for a short distance is twelve inches in diameter. At the commencement of the main six-inch sewer, however, there is placed a twelve-inch T, looking up, having thereon a twelve-inch overflow, so that in case the aggregate flow of the branches exceeds the capacity of the six-inch pipe it will flow off through the twelve-inch opening on to the surface of the ground. Near this same point the sewer passes beneath the bed of a creek, and an opening has been arranged from the creek to the sewer so as to provide for the sewer, to the extent of its capacity, taking the water of the creek at this point for flushing purposes in connection with the sewage water flowing therein for flushing purposes. As each branch sewer approaches the building it passes through what we denominate a "sewer-head," which is simply a large brick trap with cast iron cover, arranged for intercepting any solid matters which, by inadvertence or design of patients, may be thrown into the sewers through the water closets, such as rags, articles of clothing, scrub brushes, etc., etc. The sewer-heads do not, however, interfere with the free ventilation of the sewers, as there is no sewer trap contained therein, and the solid matters spoken of above are stopped solely by a grating, which can be removed, and in point of fact is removed, each week, when the sewer-heads are cleaned out and flushed out with fresh water. In the same manner, just without the main kitchen, and connected with the waste pipes leading therefrom, is a large brick grease trap, so arranged that grease from the kitchen sinks is intercepted and periodically removed, not being allowed to pass into and clog the sewers. As above stated, the storm roof water in part passes into the various sewer branches at their heads for flushing purposes, but the larger portion of this storm water is collected by means of crock pipe carefully laid, and carried to a large brick cistern constructed near the shops, built in the form of an egg, and having a capacity, when full, of thirteen hundred barrels. This water, valuable because it is soft, is used within the boilers of the Asylum. The main sewer after leaving the Asylum grounds follows the lines of streets, except in one case, where it crosses a tract of land owned by Hon. Perry Hannah, who kindly gave to the Asylum the right of way for the sewer. All branch sewer pipes are not less than six inches in diameter, excepting three, which discharge small quantities of waste.

The expenditures under this head, all from the special appropriation therefor, were made by the employment of labor directly, and the purchase of materials in open market. This method was preferred, as affording no temptation to slight work of great importance, and therefore promising with greater certainty perfect work. The table following does not include the cost of the sewer heads, as these were built under the contract of Bentleys & Nowlan, neither does it include the cost of iron sewer pipe where the sewers cross beneath the foundations, as these formed a part of the plumbing contract:

Sewer pipe.....	\$1,025 38
Hauling pipe.....	28 25
Freight on pipe and cement.....	214 60
Cast iron pipe for ventilating pipe.....	230 75
Cement.....	123 00
Picks and shovels.....	6 95
Sheet iron.....	2 08

Grease trap	\$39 60
Brick cistern	270 00
Labor	1,478 39
Coal tar	11 00
Total	<u>\$3,430 00</u>

TELEPHONE COMMUNICATION.

The Asylum is furnished with a complete system of telephone communication, reaching from a central station in the administration building, each ward, the kitchen, the shops, the barns, cottage, etc., in all twenty-four connections, of which nine connections have both hand phone and transmitter, the remainder being short connections, having merely a hand phone. There is also a line communicating with the central City office. The work of wiring, including switch board for the central station, and alarms in the engine room, to show high water in the tanks, was done by the Detroit Electrical Works, under contract, for \$550 complete. The Asylum rents the instruments, paying an annual rental of \$5 for each hand phone and \$5 for each transmitter.

In this connection and under this head the Asylum has established an electric fire alarm, connecting with the electric fire alarm system of the City, at a total cost of \$132.10; the purpose being to notify and secure the aid of the City fire department at any time of the day or night. The total amounts expended under the head of telephones are, therefore, as follows:

Wiring and central station complete	\$550 00
Electric fire alarm complete	132 10
Freight	10 79
Rental on telephone line to town	29 95
Fitting up central station office	16 99
Labor	29 29
Total	<u>\$769 12</u>

DUMB WAITERS.

Mr. A. S. King, of Pontiac, Michigan, being the lowest bidder, furnished and put in place the dumb waiters of the Institution, at a cost of \$825. There are in all nine dumb waiters: six for the dining rooms of the wards, one for the dining rooms of the administration building, one, a trunk elevator, within the administration building, and one for laundry purposes at the shops. These dumb waiters are simple in construction, durable and efficient; so arranged with a view to safety and convenience that the brake is always on, unless purposely removed, which removal can be effected from either story or from the basement.

Contract, A. S. King	\$825 00
Indicator whistles of dumb waiters	12 15
Signal bells for dumb waiters, and hinges	3 34
Labor	30 04
Total	<u>\$870 53</u>

By special appropriation \$1,705 was given for telephone communication, dumb waiters and Asylum bell. For telephone and dumb waiters were expended the sums as previously set forth, and for Asylum bell the balance of the appropriation, \$65.35.

HEATING APPARATUS.

The heating apparatus adopted is that of low pressure steam with indirect radiation, the condensed water returning to the boilers without pumping, and for this system the building in construction was designed.

The heating boilers are of the form known as the "Drop-Return-Flue Boilers," similar to those used so successfully at the Eastern Michigan Asylum, at Pontiac, and in a number of the institutions throughout the country. Of these boilers there are two, each twenty-six feet four inches long and eight feet in diameter, built throughout of homogeneous steel plates. Each boiler has two furnaces, with forty-two square feet of grate surface within the diameter of the shell, and obtained without the use of water legs to the boilers. From these furnaces the flame is conducted in six twelve-inch flues, riveted up to a rear smoke chamber, from which the flame passes down and forward to a smoke chamber situated just back of the furnaces. Within this smoke chamber the products of combustion pass downward to the rear of the boilers and out into the smoke stack through four flues, two eighteen inches in diameter and two ten inches in diameter. The thicknesses of the steel plate used are as follows :

Shells and heads 5-16 inch.

Flue sheets 3-8 inch.

Smoke chambers and furnaces 5-16 inch.

12 inch flues 9-32 inch.

18 inch flues 9-32 inch.

10 inch flues 6-32 inch.

The weight of each boiler, seventeen tons, is supported on five heavy cast iron saddles, the saddles supported upon mason work capped with inch and a half iron plates sixteen inches by forty-two inches, having steel rollers between the saddles and the plates. No mason work is used, the entire boiler being in view. The boilers are covered, both with regard to economy and appearance, with three thicknesses of asbestos paper, then two layers of one-half inch hair felt, separated by manilla paper, all surrounded with heavy Russia sheet iron, put on in sections and banded every twenty-seven inches with three inch brass bands.

The boiler room is excavated to such a depth that the water line of the boilers comes four feet above the basement floors, and eighteen inches below the bottoms of the radiators. Thus the return mains, which are placed very near the floors of the basement, are wholly below the water line in the boilers, and are consequently constantly filled with water, which acts as a steam trap.

The steam main leaves the boilers twelve inches in diameter, becoming two ten-inch mains at the branching for the north and south wings, and is gradually reduced as branches are taken therefrom. The mains throughout are of wrought iron, and are kept large to reduce friction to a minimum, and to maintain the boiler pressure at the extremes of the building. In point of fact owing to the ample space therein the steam and return mains

and the radiators may be considered but an elongated portion of the boiler space, within which there is maintained with very little friction a constant circuit or flow of steam to the radiators and water back to the boilers. The experience of the past months shows that effective circulation can be maintained with less than one-fourth of a pound pressure at the boilers, and rarely is as much as one pound pressure shown by the gauge.

The wards and administration building, except the fourth story, are heated throughout by indirect radiators, the Gold, extended surface, pin pattern placed in the basements. Each stack of these radiators is supported on two three-fourths inch wrought iron pipe brackets, and each bracket is made from a single piece of pipe bent to an angle of 60° , the ends let into holes drilled into the brick wall and sulphured in. The radiators are covered or enclosed in a manner new, effective and economical. A curtain of twenty ounce duck is hung from the ceiling of the plenum, extending from wall to wall around and six inches below each stack of radiators. The curtain is painted with silicate paint, as is also the ceiling above it, and is kept from contact with the radiators by a wire screen guard. This covering can be very readily removed or drawn aside for purposes of examination, repairs, or for the removal of accumulated dust and refuse which may be thrown down the flues by patients. It is practically incombustible, makes no noise when handled, does not radiate heat into the plenum, and, withal, its use effected a saving to the Institution of not less than \$1,000. The radiators are not enclosed from below, and no attempt is made to control the air supply at the radiators; neither are registers placed in the upper termination of the flue. Either method would diminish or stop the supply of fresh air, and instead, the engineer regulates the heat by turning on or turning off steam at the radiators to operate the desired number of stacks.

The air heated by passing over the indirect radiators passes up flues within the interior brick walls, two flues eight inches by twelve inches for each stack of radiators, and is delivered within the corridors of the wards, from which the rooms on either side thereof are heated indirectly. The warm air which enters the corridors finds no exit except through the ventilating flues of the rooms; hence the current is into the rooms through the open door or the transom thereof, and after making the circuit of the room across the ceiling, down the external wall and window and across the floor to the ventilating flue at the floor passes out, as described under the head of "Ventilation."

The fourth story of the administration building, the shop and chapel buildings are heated by direct radiation, with radiators made by the Detroit Radiator Company, and supplied with steam from the general indirect system.

In determining the sizes of the steam mains and branches and of the return pipes the following working tables were adopted:

To supply 40 square feet of surface or less, 1 inch pipe.

To supply 62 square feet of surface or less, $1\frac{1}{4}$ inch pipe.

To supply 62 square feet of surface or less, $1\frac{1}{4}$ inch pipe.

To supply 92 square feet of surface or less, $1\frac{1}{2}$ inch pipe.

To supply 17 square feet of surface or less, 2 inch pipe.

To supply 272 square feet of surface or less, $2\frac{1}{2}$ inch pipe.

To supply 424 square feet of surface or less, 3 inch pipe.

To supply 637 square feet of surface or less, $3\frac{1}{2}$ inch pipe.

- To supply 928 square feet of surface or less, 4 inch pipe.
- To supply 1215 square feet of surface or less, 4½ inch pipe.
- To supply 1630 square feet of surface or less, 5 inch pipe.
- To supply 2650 square feet of surface or less, 6 inch pipe.
- To supply 4077 square feet of surface or less, 7 inch pipe.
- To supply 6016 square feet of surface or less, 8 inch pipe.
- To supply 8586 square feet of surface or less, 9 inch pipe.
- To supply 11920 square feet of surface or less, 10 inch pipe.
- To supply 16166 square feet of surface or less, 11 inch pipe.
- To supply 21500 square feet of surface or less, 12 inch pipe.
- To drain 40 square feet of surface or less, ¾ inch pipe.
- To drain 77 square feet of surface or less, 1 inch pipe.
- To drain 127 square feet of surface or less, 1¼ inch pipe.
- To drain 222 square feet of surface or less, 1½ inch pipe.
- To drain 494 square feet of surface or less, 2 inch pipe.
- To drain 981 square feet of surface or less, 2½ inch pipe.
- To drain 1875 square feet of surface or less, 3 inch pipe.
- To drain 3176 square feet of surface or less, 3½ inch pipe.
- To drain 5850 square feet of surface or less, 4 inch pipe.
- To drain 12485 square feet of surface or less, 4½ inch pipe.
- To drain 21500 square feet of surface or less, 5 inch pipe.

With these sizes of pipes properly laid, so that the condensed water and the steam always flow in the same direction, and with the pipes properly dripped or relieved from condensed water, it is found that there is absolutely no cracking, snapping, or noise, owing to the steam and the condensed water endeavoring to occupy the same space at the same time.

The total cubic space heated and the total amount of radiating surface, counting the Gold pin radiator at its true value, eight and one-half square feet per section, when made as originally in size and number of pins, was as follows:

	Space heated, Cubic feet.	Direct radiation, Square feet.	Indirect radiation, Square feet.	Total radiation, Square feet.
Administration building.....	252,077	568	2,482	3,050
Shop buildings.....	84,458	820		820
Chapel buildings.....	107,136	1,084	85	1,169
North wing.....	576,694	108	8,219½	8,327½
South wing.....	576,694	108	7,675½	7,783½
Total.....	1,597,05	2,688	18,462	21,150

In appropriating the radiating surface to the need of the various portions, divisions and rooms, of the building very great care was exercised, the determination being dependent on many factors, primary of which is the factor of experience in heating buildings of like construction in nearly the same latitude and by the same general method. Secondary to this experience, but remaining of great importance, are the rules laid down for computing the requisite amount of heating surface from the known cubic space to be heated, the glass surface, exterior wall surface, etc.; but the results therefrom must always be modified by considerations of exposure, whether north or south, sheltered by hills, woods, or portions of the building, or fully exposed; and

of position, as of first, second or third story; of the direction, force and temperature of the prevailing winds. And a further and greater modification must be made, depending on the amount of air to be warmed solely for the purposes of ventilation.

The amount of surface has proved adequate to do the intended work in the coldest weather.

As originally intended the power boilers were furnished with the heating apparatus. These also are of steel: two horizontal tubular boilers, each six feet in diameter, sixteen feet long, having ninety-two three and one-half inch tubes and domes connected to the boilers with nozzles. As with the heating boilers the power boilers have a capacity more than sufficient under any circumstances to do the required work, and ordinarily but one is in use. The power boilers furnish steam to drive all machinery, as for the laundry, the carpenter shop, the bakery and kitchen, and for generating the electric light; also steam for cooking, and for heating water for domestic purposes at such exceptional times when the exhaust steam is not sufficient for this purpose. These boilers are inclosed in brick work, and rest on heavy cast iron frames or standards built into the brick walls; the object being to transfer the weight and the strain, because of expansion and contraction, from the upper portion to the lower portion of the wall. The furnaces are made unusually deep between the grate bars and the boilers, and consequently wood can be burned advantageously.

All exhaust steam from engines and pumps is collected together, passes through the boilers, within which all water for domestic purposes is heated, and if not there all condensed it passes into the large heating main and aids in warming the building. This is a very important saving, not only in units of heat which are utilized rather than lost, but also in returning the distilled or soft water to the boilers. In point of fact by this method water is accumulated in the heating boilers, and is returned therefrom by pumping through the hot water tank to the power boilers, so that in the whole system of boilers but a small quantity of new water is used, and that it is aimed to supply from the soft water cistern, described under the head "Sewers, Drains, and Cisterns." The major portion of this work was done under the contract of Samuel I. Pope & Co., of Chicago, but the contract of Rundle, Spence & Co., of Milwaukee, included with the plumbing and fire protection portions of the heating. The boilers were furnished, delivered at the Traverse City station by the Lansing Iron and Engine Works, and were moved to the Asylum on rollers after the manner of house moving, under the Pope contract. Quite a large amount of work has been done by hired labor, and purchase in open market, including a system of high pressure radiators for all night use in the hospital wards and other desirable places.

The coal shed is a substantial brick building seventy-five feet by thirty-nine feet six inches, with heavy stone foundation, a roof covered with roofing iron, and having a storage capacity of one thousand tons of bituminous coal. The excavation was carried even below the low level of the adjoining boiler room, so that the space enclosed by the stone foundation forms the larger portion of the storage room. This foundation was built by hired labor of field stone purchased at \$8 per cord, delivered, supplemented by stone furnished from the Asylum farm. All work and material, excepting the foundation and excavation, was done under contract with Henry Green, of Traverse City, for the sum of \$1,580. Forming a portion of the coal shed

is a room for anthracite coal, a room for the hose cart, and a room for the manufacture of soap.

Proposals were invited for covering steam and return hot and cold water pipes, and specifications were furnished, but not to the exclusion of other methods. A large number of proposals, based upon numerous patented and unpatented methods, with samples, were received. The most advantageous offer, that of J. P. Donaldson & Co., of Detroit, was taken. This provided for covering the pipes as specified with asbestos paper, hair felt, manilla paper and canvas in various combinations, in accordance with the use and exposure of the pipe. The total amount paid to J. P. Donaldson & Co. was \$2,817.64, in addition to which there has been expended directly by the Asylum the further sum of \$329.97, which latter sum includes painting the covering.

The items of expenditure under contract with Samuel I. Pope & Co., of Chicago, are as follows:

Radiators	\$5,298 84
Pipe and fittings.....	3,535 00
Valves.....	1,503 00
Moving boilers.....	450 00
Foundations for boilers and mason work.....	844 00
Saddles for boilers, rollers and plates.....	396 50
Boiler covering.....	468 00
Boiler fronts, grate bars and boiler castings.....	795 00
Air valves.....	541 53
Brackets for radiators.....	200 00
Radiator hood.....	735 00
Smoke flues.....	250 00
Pipe hangers.....	230 00
Boiler pump.....	250 00
Gauges.....	189 00
Condense tank.....	70 00
Galvanized iron boxes.....	822 00
Labor.....	2,596 50
Miscellaneous.....	204 63
<hr/>	
Total, Samuel I. Pope & Co.	\$19,379 00
2 heating boilers, contract Lansing Iron and Engine Works.....	4,855 00
2 power boilers, contract Lansing Iron and Engine Works.....	1,995 00
Pipe and fittings.....	3,059 24
Radiators.....	56 01
Scales for weighing coal.....	64 00
Wheelbarrows.....	32 25
Flue brushes.....	31 26
Registers.....	30 99
Pipe covering.....	3,147 61
Paint.....	199 53
Labor and salaries.....	4,105 65
Galvanized iron, protection of out-door pipe.....	182 01
Miscellaneous.....	347 45
2 galvanized iron ventilating turrets.....	410 00
Coal shed.....	2,111 00
<hr/>	
Total	<u>\$40,006 00</u>

VENTILATION.

The system of ventilation adopted while not new is special, in that it is applied almost wholly to buildings of this character. It has been deemed heretofore either impracticable or dangerous, or both, to admit heat generally and directly into the rooms occupied by insane patients, either from radiators, stoves or open fires ; consequently the system aims to heat these rooms indirectly ; hence to ventilate them indirectly. During cold weather the heating and ventilation of the building go hand in hand. The air is warmed by passing over radiators in the basement, and is distributed through flues within the interior brick walls to the corridors of the several stories and divisions, and passes into the rooms through an opening at the top of the transoms. This warmed air reaches the wards fresh, and is the supply for ventilation. If any portion of the building is at any time cold, it is immediately known that ventilation at that point has ceased ; that is, during cold weather sufficient heat means adequate ventilation, for the fresh air carries the heat.

The building is designed for a system of forced ventilation, the air forced to all portions of the building by means of a large fan placed within the fan tower at the shops. From the fan tower the air passes into the basements, north and south, through underground ducts or tunnels eight feet wide, six feet high, and two hundred and thirty-three feet long. The basement space beneath the corridors and passages forms continuations of the air ducts, called plenums, for distributing air to the base of the numerous flues leading to the various portions of the building. These flues all terminate in the corridors, or in the large rooms, as the dining rooms and day rooms.

The form and kind of fan was adopted after very careful and long continued investigation and inquiries, and after a number of the best firms in the country, making a business of furnishing fans for ventilating purposes, had carefully considered the work and made proposals for the ventilating contract. The fan was furnished by the Buffalo Forge Company, Buffalo, N. Y. It is fourteen feet in diameter and six feet wide, and is guaranteed to have a capacity sufficient to deliver sixty thousand cubic feet of air per minute at sixty revolutions, with a maximum resistance of thirteen horse power, and to have strength sufficient to withstand without injury a speed of one hundred and twenty revolutions per minute. A delivery of sixty thousand cubic feet of air per minute would furnish to each occupant of the Asylum, counting the total population at six hundred, one hundred cubic feet per minute ; or, one hundred and twenty revolutions per minute, nearly double that quantity. The latter is largely in excess of the normal requirements of the Asylum, and the maximum capacity is intended in part for emergencies of contagious disease, fevers, epidemics, or at times during very moderate weather when there is little or no natural movement or draft of air within the building, owing to the temperature within approaching the temperature of the air without. Again, a strong fan pressure is required in times of heavy wind to overcome the wind pressure exerted through crevices in the windows and through the porosity of the outside walls, and thus prevent cold air from entering, or prevent a downward draught in the hot air flues. A defect in this method of ventilation is found to exist, in that the fan pressure exerts itself more at those portions of the building nearest to the fan, and gradually loses its force toward the extremes of the building. To overcome this defect the capacity of the fan was increased to a maximum, hoping

by reducing the area of the nearer air exits and enlarging those more remote, to obtain an equitable distribution of air throughout the building. In seeking means to overcome this defect various methods were canvassed. Proposals were received for placing exhaust fans within the various ventilating towers upon the roofs of the building, these exhaust fans to be driven by electric motors. Also proposals were received for driving the proposed exhaust fans by endless wire cable or rawhide belts from the main engines at the shops. The first-named method, that of electric motors, would have been an experiment, and failure would have resulted in merited criticism. The second method, while practicable, was abandoned, together with the whole exhaust fan method upon the following considerations: The general system of ventilation seeks to maintain everywhere within the building a plenum condition; that is, mechanical force through the fan gives to the air within the building a pressure or tension in excess of the outer air. In consequence the warm fresh air is pressed and held closely against windows and external walls, and seeks to escape through every crevice and crack therein; the only escape provided being the ventilating flue within the room. The cold air is excluded and a comfortable temperature of the room is maintained. Now, suppose exhaust fans to be placed within the ventilating towers upon the roofs, the air is forced in at one end and drawn out at the other, and inasmuch as the exhaust fan exerts an influence that influence is to pull the warm air away from the windows and external walls, and to pull the cold air in through existing crevices and cracks and thus to destroy the comfortable warming of the rooms by inducing cold air to enter. It was decided to adhere to the full-blood plenum system, and to increase the capacity of the fan beyond that of fans in similar institutions, hoping by reducing the area of the nearer air exits and enlarging those more remote to attain an equable distribution throughout the building.

The fan is but just completed. Tests showed that at fifty revolutions the fan delivered fifty-two thousand four hundred cubic feet of air, with a total resistance of seven and two-tenths H. P. At sixty revolutions the delivery was seventy-one thousand six hundred cubic feet of air per minute, with a resistance of ten and eighty-three-hundredths H. P. At sixty-five revolutions the resistance was thirteen and one-fourth H. P. Should the use of the fan reveal deficiencies at the extremes of the building, as is possible, these deficiencies can be best supplied by auxiliary fans placed within the basement near the extremes of the building, taking the air from outside and driven from the main engines at the shops by cable connection.

The Asylum is not dependent on the fan alone for a supply of fresh air. Galvanized iron trunk flues, sixteen in all, each four feet by eighteen inches, have been constructed to admit a sufficient supply of fresh air through the outer walls into the plenums directly, and in very many places it is possible to take air directly through basement windows. In cold weather the natural draught caused by the ascending current of warmed air renders the use of the fan wholly unnecessary, as is shown by the experience of the past winter. In fact the fan is but just completed, and the flues have been connected with the ventilating towers but a short time. Still the ventilation of the building, while not perfect, has been good. In the ventilation of the building through these openings to the plenums the wind acts as a powerful auxiliary, driving the air into the basements, even when blowing at a very moderate velocity, with sufficient force to create a pressure greater than that of the most powerful fan, hence it is very essential that all ward windows be fitted air tight.

For driving the fan an Armington & Sims' engine of 30-horse power has been provided. This engine also drives the small dynamo which furnishes electric light for all night use.

Each room has one or more ventilating flues, each eight inches by eight inches, starting from the floor and leading to the attics without connection with any other room. The ventilating flues deliver into trunk flues within the attics, which are enlarged in proportion to the service they are called upon to perform, and are carried to the nearest ventilating tower by the most direct course. There are twelve ventilating towers, ten for the wards and two for the chapel building. Two of the ten for the wards have been added during the past season to make the attic exit for ventilating air more direct. The ventilating flues of the administration building have been grouped together, from three to six in a group, and carried up directly through the attic and roof to the open air.

Fresh air for the chapel room is taken directly through the outside walls onto the direct radiators. There are eight openings, having each a clear area of six by twelve inches. The natural draft through these openings may in cases of necessity be greatly accelerated by means of an exhaust fan having a capacity of five thousand cubic feet per minute, so placed in an exterior wall as to exhaust air at will either from the chapel room or from the kitchen room. The maximum capacity of the room is three hundred and eighteen. Religious services and social gatherings are always and purposely continued but a short time, one hour or less, and the average attendance is far short of the maximum capacity. The audience always starts with a room full of fresh air—a room forty-two feet by fifty-four feet by twenty-eight feet high—and very rarely are the double entrance doors closed. As these double doors open into a hall, the air of which is warmed, a supply of fresh air, almost unlimited, may be obtained.

The aggregate areas of the several openings, passages, flues, etc., through which the air passes in its travel from the fan tower to the ventilating tower are as follow:

Louvres of fan tower two hundred and sixteen square feet, in addition to which the fan on one side is connected directly with the open air.

Entrance to fan, one hundred and twenty-two square feet.

Air ducts, one for each wing and one for administration building, one hundred and eleven square feet.

Six hundred and seven hot air flues each eight inches by twelve, four hundred and four square feet.

Five hundred and four ventilating flues, each eight inches by eight inches, two hundred and twenty-four square feet.

The ventilating turrets and ventilating flues through roof of administration building one hundred and twenty-one square feet.

The items of expenditure are as follow:

Engine.....	\$652 50
Foundation and bolts.....	147 50
Trunk flues in attic.....	1,482 69
Large ventilating fan, complete in place as per contract.....	1,100 00
Labor.....	159 26
Miscellaneous.....	28 05
Total	<u>\$3,570 00</u>

ELECTRIC LIGHT.

At the very close of the period covered by the preceding biennial report the Board had arrived at a conclusion, after a full investigation thereon, as to the method to be adopted in lighting the Asylum, the determination being to use some form of incandescent electric light. The investigation of this subject, together with the reasons leading to the conclusions reached, were given in full in the preceding report. Later, the Board advertised for proposals for lighting the Asylum as required by law; in response to which numerous proposals were submitted, and a contract was entered into with the Edison Company for Isolated Lighting to furnish and install an electric light plant complete, as required by the specifications furnished, for the sum of \$11,432.60. After some delay on the part of the Company, work was commenced July, 1885, and pushed forward as rapidly as the circumstances would admit, until on November 25, 1885, the apparatus was first tried. The apparatus consists, as furnished, of:

- 2 electric dynamos of 250 light power each.
- 1 electric dynamo of 100 light power.
- 2 Armington & Sims 42 horse power engines.
- 1 Armington & Sims 30 horse power engine.
- 629 key sockets for lamps.
- 700 lamps of 16-candle power each.
- 100 lamps of 10-candle power each.
- 2 ampere indicators.
- 3 pressure indicators.

All wiring, cut-outs, plugs, switches, labor, etc., for complete installation.

It is not usual for the Electric Light Company to furnish the engines, but in this instance it was required, and was necessary in order to fully hold the Electric Light Company to full responsibility for the perfect working of the plant, *i. e.*, to cut off the possibility of attributing a defect or failure to engines put in by the Asylum.

Lights generally are placed in the corridors only, and the patients' rooms are thus lighted from the halls through the transoms over the doors; but the larger and special rooms are lighted directly, as dining rooms, day rooms, parlors, etc., and many rooms for patients have lamps at the ceilings controlled by switches in the attendants' rooms.

Electric light fixtures were furnished by Bergmann & Co., of New York City, at a total cost of \$1,395.

In operation the electric light has proved all that was anticipated. On entering a room a slight pressure on a button at the side of the door lights one or all of the room lights, according to the number of lamps turned on by the keys at the lamps. It has been found that patients do not interfere with the lamps, as was anticipated might be the case. The lamps are not protected and still in no instance thus far has a lamp been broken by a patient.

The Edison Company guarantees that the average life of the lamps shall not be less than six hundred hours of burning. The company also guarantees that eight lights of sixteen candle power each shall be produced by the expenditure of each horse power.

All the wiring within the wards was placed beneath hard wood finished mouldings; the mouldings placed in the angle formed by the ceiling and side wall. By this arrangement the electric light wires were kept from contact

with the wire cloth of the plastering, decreasing the fire risk and rendering the wires at all times accessible for examination and repairs; and should a fire be started it would find nothing but moulding in plain view to burn until it had passed through the plastered ceiling. An objection to the mouldings on the score of looks was removed by placing mouldings opposite those concealing the wires, thus dividing the ceilings in panels, an improvement rather than a detraction.

It will be noticed that the arrangement of dynamos and engines is in duplicate, there being two large engines and two large dynamos. This provides against the emergency of breakage or stoppage in either one dynamo or one engine—a very necessary arrangement. For all night light a third small engine and dynamo is used. The Asylum force is increased by the electric light to the extent of an additional assistant engineer for all night work; and the service of an additional fireman is required during that portion of the year when heat is not required in the building; otherwise the number of Asylum employés is not increased.

Estimates made by the engineer show that the cost of the electric light is equivalent to that of gas at 75 cents per thousand feet. This takes into account the additional labor above named and the fuel used for driving the engines, but deducts from the total expenditure for fuel the value of the exhaust steam, which is applied, first, to heating water for domestic purposes, and second, if not all thus used, to heating the building by being exhausted into the large steam main.

Experience has proved beyond question the superiority of incandescent electric light over gas for use in an Asylum for the insane. The volume of light obtained is without doubt double. The light is absolutely steady and pleasant, does not vitiate the air by throwing off carbonic acid, or destroy its vitality by consuming the oxygen of the air to support combustion. Nor is the air heated, as is the case with gas—an important consideration in warm weather. It is more easily operated, under more perfect and instant control, and materially decreases the fire risk, as compared with gas, by removing matches and open flame from the building. The cost does not vary from the anticipations of my original estimate, or, but slightly, i.e., three-eighths of a cent per lamp per hour, equivalent to gas at seventy-five cents per thousand feet.

Subsequently to closing the contract with the Edison Company a row of street lamps was placed between the front entrance of the building and the limits of the Asylum grounds toward the city, and from this line lights were carried into the dwelling house named under "Outbuildings." Lights were also placed at the same time within the barn, temporarily used as a carriage barn. The total cost of this work was \$469.01.

After the completion of the general farm barn and the carriage barn these were lighted, together with the cow barn, previously built, with electric light, the work being done under the supervision of the engineer of the Asylum at a total cost of \$266.93. By placing the electric light within the barns, as above, all necessity for matches and lanterns therein is removed. The total number of lamps installed is six hundred and sixty, but the daily average use is about two hundred and eighty. The sums expended for electric lighting are shown, as follows:

Contract of Edison Company for Isolated Lighting complete, except engines, paid for by special appropriation for engines .. \$8,659 70

Electric light fixtures	\$1,395 00
Road lights, dwelling house and barn lights	469 01
Wiring and lighting general farm barn, carriage barn and cow barn	266 93
Miscellaneous and labor	377 91
Total	<u>\$11,168 55</u>

COOKING APPARATUS.

The outfit for the general and special kitchens was purchased of the John Van Range Co., of Cincinnati, after inviting proposals from a number of firms. The proposal of the John Van Range Company was not as low as some others, but a comparative examination led to the belief that the goods were very heavy and substantial in construction, and therefore would prove more durable and economical in the end. Knowing how rapidly goods of this character deteriorate if not made in the very best manner, it was felt to be true economy to purchase the very best the market affords. It is proper to add that after the test of use for months the apparatus has proved everything that was expected. The total amount paid to the John Van Range Company was \$2,369.50. The food cars were made by the Eastern Michigan Asylum at Pontiac, and are models in construction and finish.

The items of the outfit are:

1 14-foot 3 oven range, complete	\$607 50
2 30-inch broilers, complete	120 00
1 canopy over range and broilers	60 00
1 6-foot range, complete	154 20
1 18-inch broiler	30 00
1 canopy for range and broiler	30 00
1 steam table, 10 feet by 2 feet 8 inches, with seven compartments for cooking vegetables, with canopy complete	133 00
Tea and coffee apparatus, complete	513 00
2 75-gallon copper jacketed kettles	256 00
1 40-gallon copper jacketed kettle	94 00
1 60-gallon cast iron steam kettle for grease	33 00
1 45-pound coffee roaster	31 35
1 meat hasher	80 00
Vegetable tubs	12 50
Trucks and scales	36 00
Coffee and spice mills	12 35
Refrigerators	53 20
2 food cars, for distributing food to the dining rooms	258 30
21 copper sauce pans, 1 8-gallon soup kettle, 1 sugar kettle	181 80
Miscellaneous, colanders, steamers, sieves, graters, egg whips, saws, cleavers, skimmers, ladles, griddles, flesh forks, 15 fry pans, muffin cards, meat grinders, gridirons, grease kettles, cake cutters, ice picks, cooks' knives, etc., etc.	292 29
Tables, shelving and cupboards in kitchen	199 07
Connecting apparatus	17 63
Miscellaneous, labor, etc.	31 93
Total	<u>\$3,237 12</u>

BAKING APPARATUS.

At the time the plans for the building were originally prepared a place was designed for the oven on the kitchen floor of the chapel building, beneath the dormitories of the second and third stories of that building. As the building progressed it became more and more apparent that a mistake would be made should the oven be located as originally designed. It would render the dormitories during summer time very uncomfortable, would materially increase the danger from fire within the kitchen or chapel building; and the limited room for both the bakery and the oven would compel the use of the rotary oven, while it was found that many bakers preferred the old-fashioned brick oven. So soon as the progress of the work had demonstrated that funds could be spared for the purpose, a bakery building, to include also large refrigerator rooms for meat, butter, eggs, vegetables, etc., was designed, and the construction commenced. Within this bakery building were constructed two large brick ovens, twelve feet by eight feet inside, of the most approved form and design. These ovens were built by Mr. George Rickman, of Kalamazoo, Michigan, who has had large experience in this class of work, and have proved thoroughly adapted to the work.

In a small room in connection with the bakery is placed a large sink of special design for cooking fried cakes, the odors from which are carried directly into the chimney.

A portion of the room within the kitchen building, originally designed for the bakery, is conveniently used for bakery purposes, and here has been placed a soft dough mixer, for making cake, beating eggs, etc., and run by power from the main engine.

The itemized expenses are:

Fire brick and cement for ovens.....	\$305 50
Castings for ovens.....	67 86
Mason work on ovens.....	115 10
Russia iron ware for bakery-pans, etc.....	110 50
Dough trough.....	19 70
Ferment tub.....	4 00
Tables, shelving, cupboards, etc.....	57 35
Lumber for baking building, in part.....	210 43
Pyrometer.....	28 75
Soft dough mixer.....	50 00
Doughnut fryer.....	29 50
Shafting, belting, etc.....	63 23
Miscellaneous.....	18 17
Total.....	<u>\$1,080 09</u>

LAUNDRY APPARATUS.

Proposals for fitting up the laundry in a manner adequate to provide for the maximum population were invited from a number of standard firms, each firm bidding upon those articles considered by itself necessary for a complete outfit. These bids were very diverse, both in kind of apparatus, arrangement and cost. They were very carefully considered and sifted as to their

respective merits, but no one was accepted. Subsequently three firms which had previously bid were invited to name definite price for fitting up the laundry in a manner specified, each firm being allowed, however, to use its own goods, and holding in the main to the ideas contained in the previous bids of these firms. These proposals will all be found in the printed lists of proposals herewith. The work was finally awarded to The A. M. Dolph Co., of Cincinnati, O., which bid was considered in a slight degree more favorable than the others, and provided a nearly complete laundry outfit, including pipe, plumbing, belting, shafting, etc., for the sum of \$2,900. The articles used are sufficiently shown by the following table:

4 Cylinder reversing washing machines, each 38 inches in diameter by 64 long.....	\$810 00
1 Sixty-four inch cylinder, three-roll mangle.....	427 50
1 Thirty-inch centrifugal extractor.....	283 50
1 Dry room, complete, twelve hundred and fifty feet of inch pipe..	200 00
1 Combined shirt, collar and cuff ironer and fixtures.....	175 50
1 Stove room and sad iron heater.....	72 00
3 Iron soap tanks, each forty-eight inches in diameter, and 1 soap kettle.....	82 00
1 Collar and cuff shaper.....	22 50
Tables, shelving, clothing boxes, etc.....	173 90
Miscellaneous.....	130 02
Total.....	<u>\$2,376 92</u>

The outfit has proved more than adequate to the needs of the Institution, and all the articles furnished are doing good work. The soap tanks and kettles have enabled the Institution thus far to make its own soap, except a small quantity of hard soap, which will hereafter also be made by the Institution. The large mangle, or ironing machine, is covered with a galvanized wire screen guard, so that by no possibility can the operator, working patients, or inquisitive persons receive injury through being drawn into the machine.

IRON WORKING APPARATUS.

The expenditures under this head have furnished quite completely a blacksmith shop, with blacksmith tools, and with all the main implements necessary for doing pipe fitting and plumbing work, all of which branches of work are carried on with the Asylum force. The table shows:

Vise, pipe cutters, dies, taps, wrenches, etc.....	\$121 54
Anvils, tongs, hammers, chisels, etc.....	45 77
Forge and blower.....	8 00
Charcoal furnace, soldering irons.....	3 98
Freight and miscellaneous.....	8 79
Total.....	<u>\$188 08</u>

CARPENTER APPARATUS.

In outfitting the carpenter shop with apparatus more space was found to

be essential, and this space could be attained by cutting away a wall between the carpenter shop and a hall adjoining, throwing the hall within the carpenter shop, which was accordingly done.

The carpenter shop has been fitted up with a twenty-four inch planer, a universal rip and cross-cut saw, having a buzz attachment for taking lumber out of wind, a lathe with attachments, complete, scroll saw, foot mortiser, emery wheel and large grindstone; all of which have rendered excellent service in the prosecution of our work in and about the Asylum. The planer and saw table were made by the Cordesman Machine Company, of Cincinnati. The lathe by Herbert Baker, of Toledo, the scroll saw by the Williamsport Machine Company, of Pennsylvania, and the mortiser by J. A. Fay & Co., furnished by James Jenks, of Detroit. In an Institution of this size and character a complete carpenter outfit is very desirable, since carpenter, joiner or furniture work is constantly demanded, either because of repairs, changes or additions, and a material saving can be effected by the use of machinery. The items are:

Twenty-four inch planer.....	\$114 00
Universal rip and cross-cut saw table.....	142 50
Lathe and attachments complete.....	85 88
Scroll saw complete.....	65 00
Foot mortiser.....	48 40
Emery machine.....	18 91
Grindstone, seven hundred pounds.....	14 10
Freight on machinery.....	22 33
Labor placing machinery and changes in carpenter shop.....	228 44
Carpenter tools, etc.....	30 38
Oil tank.....	7 85
Total	<u>\$777 79</u>

There was appropriated for cooking apparatus, laundry apparatus, baking apparatus, iron working apparatus and carpenter apparatus, \$7,660, the expenditure of which has been accounted for in the foregoing tables, as follows:

Cooking apparatus.....	\$3237 12
Laundry apparatus.....	2376 92
Baking apparatus.....	1080 09
Iron working apparatus.....	188 08
Carpenter apparatus.....	777 79
Total	<u>\$7,660 00</u>

GRADING.

There has been expended for grading the total sum of \$2,111.19, of which \$1,600 was from the special appropriation and \$511.19 from the general fund. At the commencement of the work of grading proposals were invited and considered. The lowest price was at the rate of 18 cents per yard, which bid it was not deemed advisable to accept. A portion of the work which could be accurately measured in place, 4,581 cubic yards, cost by

day's labor ten and three-fourth cents per yard. The work was done at different times during the years 1884, 1885 and 1886, as the progress of the building made it necessary.

SIDEWALKS.

The special appropriation for sidewalks and airing courts, \$1,260, has been expended wholly for the purpose of sidewalks; the medical superintendent preferring to give to all the patients the larger liberty of the grounds, under the constant supervision of attendants, rather than to confine them within the monotonous enclosure of airing courts. Notwithstanding, the special appropriation proved insufficient to build all the necessary sidewalks, and quite a sum has been taken therefor from the general fund. There has been built complete sidewalks about the entire circuit of the buildings, and a sidewalk upon each side of the main road entrance between the Asylum building and the limits of the grounds. The amounts and kinds of sidewalks built are as follows:

Two thousand feet of maple sidewalk, four feet wide.

Six hundred and fifteen feet of pine sidewalk, four feet wide.

Four thousand five hundred and forty feet of pine side walk, six feet wide.

In addition there has been constructed in front of the administration building and leading to the side entrance of the wings thirteen hundred and fifty square feet of cement walk, at a total cost of \$105. This work was done by Mr. George Sales, of Kalamazoo, Michigan, and has proved an excellent work. The items of expense are:

Lumber	\$538 40
Labor	498 67
Nails	130 43
Cement	92 50
Total	<u>\$1,260 00</u>

SUPPLYING ASYLUM WITH WATER.

From the nature of the ground and the appearance of the surrounding country it was believed that an ample supply of pure water for all the purposes of the institution, excepting fire, could be taken from the ground. Should this prove to be the case it would insure an unvarying quality to the water, freedom from surface impurities, and the variations incident to storms, drouth, etc. It was therefore determined to pass by the supply of spring water contained in the brook, which crosses beneath the building, until investigations could be made to determine whether an adequate supply could be secured from a large well. Preliminary tests were made by sinking a 2-inch drive tube. Water was found at thirty-seven feet eight inches in coarse sand. The tube was driven after striking water a further distance of thirty-nine feet, passing all the while through coarse sand, at times approaching gravel in character. At intervals during the sinking of this tube the water was pumped therefrom. The flow was very free and ample, and all the indications pointed to a very large supply of water. An arrangement was then made with Mr. M. W. Sweet, of Adrian—a man of large experience in well work, and who had constructed the large well at Pontiac,

which has proved so successful—for superintending the work of constructing a large well here. Mr. Sweet, after examining the material taken from the drive well, thought that to supply the institution adequately a well should be constructed having an inside diameter not less than sixteen feet and a depth within the water of twenty feet. An excavation was commenced six feet larger than the intended well, curbed with three inch plank and heavily timbered. This was carried down to the water, at which point brick work was commenced, resting upon a curbing made of several thicknesses of plank thoroughly spiked and bolted together, and having a cutting lip on the lower and outer side. Iron rods passed from the curbing up through the brick work every three feet in the circumference of the well. At intervals these rods would be terminated and clamped to the brick work. New rods were then fastened thereto and continued on up through the brick work. After the brick work had been carried to a height of twenty feet, which was the depth to which it was expected to settle within the water, a corbel of brick work was built on the inside to receive a circular track. Upon this track was placed a platform, mounted on wheels so as to revolve, and on the platform an apparatus having an endless chain with pockets, fastened thereto after the manner of a grain elevator, for scooping earth from the bottom of the well. By the revolution of the platform and varying the slant of the dredging machine it could be made to dig at any desired point beneath the water's surface. As this dredging of material from the well proceeded the entire work was gradually settled within the water. In the main the sinking proceeded favorably, but at times in order to overcome the resistance to settlement it was necessary to increase the weight by additions of brick work to the brick curbing. The diameter of the curbing or shaft was gradually reduced from twenty feet to twelve feet, and at this diameter was built up to the surface of ground.

The well has proved a very gratifying success, supplying the Institution with all water necessary for domestic purposes, averaging, with the present population, not less than thirty-six thousand gallons per day, and is capable of supplying continuously up to, and we know not how much beyond, the limits of the capacity of the pump, two hundred and sixty-three gallons per minute, at one hundred feet piston travel. The water is hard but is of good quality, wholesome and palatable.

The brick curbing near the surface of the ground was changed from a circle to an octagon, and from brick to stone for a foundation, and upon this foundation was built a neat octagonal well house twelve feet in diameter.

Within the well house was placed a Smith & Vaile deep well pump, having a steam cylinder of fourteen inches, a water cylinder of seven and one half inches, and an eighteen inch stroke. The steam cylinder was placed on the floor of the well house and the water cylinder on a platform near the surface of the water in the well. The two cylinders are connected by a heavy solid piston rod which is guided and braced by means of two large cast iron pipes, one of which serves both as a discharge pipe and as an air chamber for the water cylinder. This pump has worked admirably. It delivers the water directly into the tanks in the attics, and is so connected that it can be used for boiler feeding or for fire purposes, either alone or in connection with the fire pump. With seventeen feet four inches of water within the well it has not been possible to reduce the depth by continuous pumping more than four feet; and the experience of the year now nearly passed seems to demon-

strate that the supply of water is practically inexhaustible. The cost, which was largely increased by accidental damage to the work during its progress, has been as follows:

Preliminary test well.....	\$50 00
Labor.....	1,617 53
Placing pump and discharging the same, complete, with supplying the steaming discharge pipes....	311 54
Lumber for curbing, etc.....	278 93
Brick	492 00
<hr/>	
Total paid from special appropriation.....	\$2,750 00

Paid from General Appropriation—Material.

Brick and lime for curbing.....	\$404 21
Labor.....	477 96
Miscellaneous.....	11 70
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Total	\$3,643 87

In addition to the above sums the deep well pump cost \$630, paid from the plumbing appropriation; and the well house cost \$188.84, classed under outbuildings in the general appropriation.

PLUMBING.

Under this term is included all hot and cold water distribution, the large attic water tanks, all fixtures through which water passes, as baths, sinks, closets, etc., and all waste and ventilating pipes and accessories thereto, as traps, valves, fittings, etc. Also the pumps and the boilers for heating water for domestic purposes.

After very careful consideration the system of trap ventilation with large ventilating pipes was adopted rather than any system of mechanical traps expected to effectually bar the passage of sewer gas. In connection with the trap ventilation and in unity of purpose auxiliary thereto all soil and waste pipes were thoroughly ventilated, the aim being to pass a current of the air continuously therethrough. The objections urged against trap ventilation are well known. Sewer gas will pass through water and escape upon the house side. Ventilated traps can be syphoned and will lose their water seal through evaporation. In arriving at a conclusion, however, it was known that the fixtures of a building used for asylum purposes are without exception in constant daily use. The danger from evaporation, therefore, does not exist. This constant use, moreover, causes a continued ventilation of the pipes through induced currents of air forced or drawn by the moving wastes, and also tends to keep the waste pipe system thoroughly flushed out. While it is possible in experimentation to syphon out most ventilated traps, still, under the conditions of ordinary daily use, the probability that such syphonage will take place is very remote; and should it take place the danger therefrom will be reduced to a minimum, both through the absence of sewer gas proper within the pipes, owing to their cleanly condition, and

dilution of the gases therein through ventilation, and by the short time that the trap would remain open before the fixture would be again used. It is believed to be safer to prevent the formation of sewer gas by ventilating and oxidizing and washing out the wastes adhering to the pipes than to rely on mechanical devices to bar the entrance of the sewer gas to the building after it has been formed.

In designing the plumbing work the following principles were kept in view:

To use traps only at the fixtures and as near thereto as possible.

To make traps generally one size smaller than the waste pipe leading therefrom.

To ventilate each trap independently, making the ventilating branch the same size as the waste pipe and similarly to ventilate all soil and waste pipe in pipes of equal size thereto.

To carry all branch ventilating pipes into the large ventilating pipes by the shortest and most direct course, avoiding angles, and to carry the main ventilating pipes to the open air above the roof.

To join the main ventilating pipe with the soil pipe at the foot of the pipe shafts in the basement, and carry both these pipes, enlarged at the upper end, through the roof to the outer air.

To make both service and waste pipes large, but no soil pipe larger than four inch.

To make sink, lavatory, and urinal wastes generally fall directly to the basement before entering the main soil pipe; that is, allow no horizontal runs or pipes slightly inclined.

To conceal no pipes within brick walls, or plastering, or back of boarding.

To use no wood work about sinks, bath tubs and wash stands, and only for the seats about water closet hoppers.

To bury no waste pipe that can be left in view, carrying them either above the basement floor or on the ceiling thereof.

To allow no connection between the sewer system and the tanks in the attics.

To keep all urinal waste pipes small, that the flush from the tanks used therewith may prevent the usual foul deposits within the pipes.

Conveniently distributed, resting upon brick walls in the attics, are four large cold water tanks, each nine feet six inches high and twelve feet in diameter, and one nine feet six inches high and four feet six inches in diameter. The aggregate capacity is 33,240 gallons. The tanks are all placed at the same level, consequently they fill and discharge at the same time. The tanks are built of tank steel plate one-eighth inch thick, thoroughly riveted; are painted inside and out and covered, water and air tight, with the same thickness of tank steel. This covering prevents any contamination of the water within the tank from confined or vitiated air in the attics arising from the living rooms below, or from escaping sewer gas. The overflow is through pipes which pass from the top of the covers up and through the roof and look down toward the roof gutters, into which the overflow discharges. A galvanized iron drip pan, painted, is placed beneath each tank to catch the drip, condensed upon the cool surface of the tanks from the moist air of the attics, and this condensed water is carried to the nearest gutter or to the ground within the pipe shafts, no connection being made with the sewer system.

Water is distributed directly from the tanks in the attics. In only two cases is a branch taken from the service main, namely, for the shop building and for the chapel building; and in each of these cases in order to prevent concussion at the fixtures an air chamber is used, made from a length of eight-inch wrought iron pipe placed vertically, the supply and discharge both entering and leaving a blank flange at the bottom of the air chamber.

The sizes of the distributing pipes at the fixtures for both hot and cold water are, for sinks, slop sinks, urinals, bath-tubs of first and second stories three-fourths inch; for wash-bowls, one-half inch; for bath-tubs of third story, one inch; for water closets one and one-fourth inch, all of wrought iron.

The production and distribution of hot water for domestic purposes is very complete and efficient, and withal economical. Within the boiler room are placed two hot water boilers of new and peculiar design. Each is four feet in diameter, bent to a right angle at the centre of the length, which is seventeen feet around the exterior angle and nine over the interior angle. At each end is a steam chamber six inches deep. Passed through the centre of the boiler are twenty-four two inch brass tubes bent to a right angle at the centre, the ends expanded into the interior heads of the steam chambers. The main body of the boiler is filled with water, which is heated by the passage of steam through the tubes. The boilers are arranged with eight inch steam inlet and outlet, that the exhaust steam from engines and pumps may be used therein. If this exhaust steam is not all condensed within the hot water boilers it passes on and enters the low pressure heating main, and is utilized for heating the building. The large size of the boilers and their shape gives space for the accumulations of deposits from the hard water without compelling it to enter the pipes, at the same time facilitating this deposit. There is also room for entrance through a manhole for examination, cleaning out or repairs. The angle in the body of the boilers prevents the expansion and contraction of the brass tubes from destroying the expanded joint at the joining of the tube heads. The capacity is so ample that one boiler will suffice while the other is being cleaned out, and the use of exhaust steam gives to the institution hot water at little cost.

The hot water is distributed to all portions of the asylum buildings through a complete hot water circulating system; that is the hot water main which leaves the boiler three and one half inches in diameter, branches and sub-divides, and reduces within the attics until passing down it reaches the various fixtures, in sizes as before named. From the fixtures the hot water pipes continue down to the basements, where, as before they branched, they are now collected in pipes enlarging and returning, reaching hot water boilers in a single two and one-half inch pipe. By this circulation hot water is at all times available at each fixture.

The waste pipes and the ventilating pipes are generally of cast iron, and are placed within pipe shafts built for the purpose, that these pipes may be always accessible for repairs and inspection.

Before each set of ventilating and waste pipes was accepted it was filled to the top with water, which must remain for hours within the pipe unchanged in height as a test of tightness.

It is believed that constant currents of air will be induced through the waste and soil pipes, either entering the soil pipes and branches and finding exit through the ventilating pipes and branches or vice versa. This current

will be induced; first, by the relative positions of the soil and ventilating pipes as to heat or cold; second, because of hot water discharged within the waste pipes and heating the air therein; third, by air within the waste pipes forced ahead of descending columns of waste water, drawing after it currents of air from the ventilating pipes. The large size of the ventilating pipes, it is thought, will practically prevent these moving currents of air from forcing or syphoning the traps.

The urinal waste pipes are of galvanized iron, and are made small, reduced to that limit where danger of overflow may be apprehended at the fixture from the Kelly flush tank, used with each urinal. Thus, a third story urinal waste is one inch, delivering into second story urinal waste one and one-fourth inch, and in turn into the first story waste of the same size. This system has worked admirably.

The waste outlets and the ventilating branches in sizes are:

Bath tub, sink and slop sink outlets, one and one-half inch; traps, one and one-fourth inch.

Washbowl outlets one and one-fourth inch; traps one inch.

Urinal outlets one inch; traps one inch.

It is worthy of remark that the exposed pipes beneath sinks, washbowls, etc., unenclosed by wood work, have in no instance been disturbed or injured by patients.

The bath tubs are of cast iron, painted, except two, which are of cast iron enameled. Hot and cold water is admitted near the bottom of the tub; thus hot water mingles immediately with the cold water and reduces the danger of accident from scalding; while, at the same time, the entrance is comparatively noiseless.

All urinals are lipped and hooded with ventilating pipe outlets. The urinals of the wards are of enameled iron, and each urinal throughout is flushed by a Kelly tank. The weight of a person on a platform placed at the floor beneath the urinal opens a valve and allows the tank to be filled with water, which is discharged with considerable force, and a large flow upon the removal of the weight from the platform. The operating chain is made inaccessible by passing it up and through a length of wrought iron pipe. The operation of the whole urinal system has been exceedingly satisfactory.

For the wards iron, enameled, straight-backed, small outlet hoppers were used; elsewhere all earthenware, ventilated, wash-out closets were used, and throughout each hopper is furnished with a large cistern or flushing tank, operated by the lid of the hopper, as in the wards, or by a pull as elsewhere.

The hoods of all urinals and the hoppers of all the earthenware closets are ventilated independently of the sewer system of ventilation, with four inch spiral galvanized sheet iron pipe, carried through the pipe shafts above the roof to the open air.

The lavatories are fitted up with enameled iron wash bowls supported upon brackets, except that two marble top fixtures were placed in the administration building.

The following are the items of expenditure:

PLUMBING.

Five cold water tanks.....	\$1,175 00
Twenty-two bath tubs	386 00
Forty-seven sinks and slop sinks.....	144 05
Twenty urinals and fifty-one water closets.....	1,536 00
Twenty-six wash stands.....	299 20
Two hot water boilers.....	1,750 00
Foundations for hot water boilers.....	60 00
Deep well pump.....	630 00
Hose.....	480 80
Soil and waste pipe.....	954 00
Cast iron water pipe.....	369 00
Cast iron ventilating pipe.....	258 50
Wrought iron pipe.....	672 26
Fittings for iron pipe.....	336 00
Valves, cocks, etc.....	407 75
Lead pipe and solder.....	128 00
Five drip pans.....	50 00
Connections to tanks.....	130 00
Iron beams for supporting tanks.....	450 00
Labor for all purposes.....	2,272 41
Miscellaneous, and incidentals in schedule.....	886 03
Total.....	<u>\$13,375 00</u>

Of this total amount \$12,689.70 was expended under contract of Rundle, Spence & Co., and \$630 was paid for a deep well pump to Smith, Vaile & Co., Dayton, Ohio.

FIRE PROTECTION.

The expenditures under this head represent but a small portion of the money that has been expended to secure immunity against the danger of fire. The larger expenditures are classed as construction, and have secured a building whose interior walls are of solid brick, whose cornices are of galvanized iron, ceilings all lathed with wire cloth, floors all protected with one and one-half inches thickness of calcined plaster mortar, and all corridor and division walls built through the attics up to and against the boarding of the roof, thus dividing the attics into small apartments, fire in any one of which would slowly and with difficulty be communicated to another. In addition fire proof doors, forty-seven in all, tinned both sides, with the door frames also tinned, as recommended by the Boards of Fire Underwriters, have been placed in all the openings between divisions, into the openings leading into stairways and to the attics, and in all openings in the brick walls of the attics. It will be seen that the effort to prevent fire has materially increased the aggregate cost; but remembering the many asylums in various parts of the United States which have been partially or wholly destroyed by fire during the past ten years, no other safe and judicious course could have been taken. Should a fire occur it is felt that its progress from room to room and from story to story must be slow, giving time to stay its advance and in the end that its limits must be very much restricted.

To provide against the emergency of fire, however, a complete fire apparatus has been provided at an outlay aggregating \$4,115.00. This apparatus consists of a powerful fire pump, fire mains and risers, hose, hydrants, fire reservoir and reservoir pond. The water supply comes from two alternative sources: the creek which runs beneath the asylum building, or from the asylum well, either or both. The eight-inch suction pipe of the fire pump leads to a fire cistern connected with the creek; above this cistern and connected thereto is an artificial pond, exclusively for fire purposes, holding a large amount of water. The fire pump was furnished by Smith, Vaile & Co., of Dayton, Ohio, and is the most powerful engine upon the premises. It has a steam cylinder eighteen inches in diameter, a water cylinder ten inches in diameter and a stroke of two feet. At fifty strokes or revolutions per minute the pump has a capacity, by actual test, of four and one-half times the amount of water running in the brook beneath the building. Hence the necessity for a fire pond.

Without the building are placed at suitable points seven fire hydrants, and hose has been provided sufficient to reach all external portions of the building.

The fire mains pass from the pump through the basements six inches in diameter and branch to the hydrants four inches in diameter, all angles being made with curves of large radius, or where this is not possible the elbow has been enlarged one size.

From these mains in the basement five two and one-half inch stand pipes rise to the attics, one entering each cold water tank. From these stand pipes are taken thirty-four hose connections, with hose valves and hose permanently attached sufficient to reach all interior portions of the building. As before stated five fire risers terminate in the cold water tanks, and a check valve is placed in the riser just before reaching the tank. Should a fire occur the tank water and pressure is available instantly on opening the hose valve. The moment, however, that the fire pump is started the check valves at the tanks are closed by the water from the pump rushing into the tank, and the fire pressure of the pump is maintained.

The fire pump stands ready to start at any time of the day or night. It is very frequently tried and kept in order. Steam pressure is always maintained within one of the power boilers; during the day for power purposes and for cooking, and during the night to drive the electric light engines. In the emergency of damage to the fire pump the deep well pump, having an extreme capacity of four hundred gallons per minute, is also connected with the mains, and can be used for fire purposes either separately or in connection with the fire pump. This also gives an auxiliary supply of water should such become necessary from exhaustion of the fire pond during a long continued fire. The fire pump is also cross-connected so that it can be used for all the purposes of the institution in case the well pump breaks down.

A two-inch supply and fire pipe is laid to the barns, from which is taken hose connections, and similarly a two and one-half inch pipe has been provided to reach and protect the cottage.

The hose cart and a room for the same in connection with the coal shed completes the fire apparatus:

Fire pump.....	\$875 00
Hydrants.....	245 00
Hose.....	1,870 00

Hose valves.....	\$154 00
Cast iron pipe.....	876 00
Protection over stairways.....	95 00
Total.....	<u>\$4,115 00</u>

FURNISHING WARDS, ADMINISTRATION BUILDING AND DORMITORIES.

The furnishing was all purchased from the special appropriation therefor. In each case lists or specifications were made of the goods needed, giving description, number and kind, and proposals were invited from reliable dealers, which proposals were carefully canvassed, and the one most advantageous to the State, quality and price both considered, was accepted. It was the aim to regard economy in its broadest sense by providing throughout a class of goods that should be durable, adapted to the purpose, neat and pleasing in appearance and comfortable in use. With these features constantly in view the goods were purchased in the cheapest market, which was found through competitive offers. These competitive proposals are printed herewith, and show sufficiently the cost and number of individual articles. The following table shows the expenditures:

Bedsteads.....	\$2,386 00
Bureaus.....	1,076 90
Wardrobes.....	875 36
Woven wire mattresses.....	1,161 32
Hair mattresses and pillows.....	6,226 67
Feather pillows.....	334 51
Chairs.....	1,661 66
Tables and stands.....	1,010 05
Sideboards.....	91 00
Crockery.....	728 30
Bedroom suites.....	393 75
Parlor suites.....	221 35
Lounges.....	144 47
Book cases.....	173 70
Desk.....	20 00
Hall stands.....	45 90
Clocks.....	125 22
Organs.....	149 85
Sewing machines.....	60 00
Carpets.....	2,150 23
Window curtains.....	269 99
Table linen.....	566 27
Towels and toweling.....	390 17
Baskets.....	74 00
Blankets.....	1,927 20
Counterpanes.....	753 64
Comfortables.....	984 00
Sheets and pillow slips.....	1,354 50
Mirrors.....	313 40
Cutlery and plated ware.....	1,175 67

Lambrequins.....	\$38 83
Cupboards and shelving for kitchens.....	255 74
Fitting up eighteen clothes rooms, with boxes for patients' clothes and eighteen china closets.....	506 20
Boxing for hose cupboards, shelving, etc.,	200 25
Lumber for boxing and shelving.....	108 68
Drayage on furniture.....	95 30
Freight on furniture.....	363 21
Labor, handling and putting together.....	701 10
Brushes.....	83 28
Rubber sheets.....	141 88
Razors, scissors, etc.,.....	193 74
Heavy tinware for distributing food, kitchen outfit, etc.....	281 58
Miscellaneous.....	560 13
Total.....	<u>\$30,375 00</u>

The bedsteads, bureaus, wardrobes, tables and stands, for the use of patients and attendants, were purchased of the Widdicomb Furniture Company, Grand Rapids, and are of ash finished with an oil rubbed surface. The cost was low and the quality and appearance good. Specifications were furnished for the competition, which was active. The contractor strove to make the goods first class in every respect, suggesting modifications of improvement in appearance without additional cost in several instances. The bedsteads for patients are single with solid paneled head and foot boards, the end rails mortised and tenoned to the posts, which are not allowed to extend above the top rail sufficient to suggest to suicidal patients the possibility of an attachment for hanging, and the heavy side rails are fastened to the posts with bed screws through the posts, the heads countersunk therein, making a tight joint, within which nothing can find lodgement, and unremovable except by the use of a peculiarly constructed bed wrench.

The woven wire mattresses rest on cleats screwed to the sides of the bed rails, and these cleats serve also to cover the nut end of the bed screws, which are let into the rails. Bedsteads and mattresses for the male patients were made four inches longer than for the female patients.

There are no important distinctive features in the construction of the bureaus, wardrobes, tables and stands. All are made solid and strong, but, as are the bedsteads, very tasty, and the polished finish is most excellent.

Hair mattresses and pillows were made by Nelson, Matter & Co., of Grand Rapids, from pure South American horse hair of the grade known as "Soft," at thirty-eight cents per pound, made up in A. C. A. ticking. This grade of hair and this offer was deemed most advantageous for the State. The mattresses for single beds were made to weigh twenty-five pounds each, the hair pillows three pounds each. For the purposes of an insane asylum the hair mattress has been proved best adapted, owing to its cleanliness, its neatness, elasticity and durability. The latter quality depending upon its power, if in reality of horse hair without adulteration, to withstand successive washings and repickings, makes this mattress cheaper even than straw.

Feather pillows were purchased of Marshall Field & Co., Chicago, at fifty-seven and one half cents per pound made up.

Counterpanes were purchased of the same firm at eighty-two and one half cents each for Bates' quilts; also white domestic Holland for curtains and fixtures therefor.

A varied numerous list of chairs, sixteen hundred and eighty-five in all, of fifty-seven different kinds, was purchased, the main bill, of Ford, Johnson & Co., of Chicago, and included a heavy and strong but comfortable chair and rocker, made especially for ward use. This chair has proved well adapted for the intended service; strong, durable and comfortable. The seat is of wood, made in one piece, well shaped. The seat is let into the legs rather than having the legs enter the seat, and a heavy screw passes through and holds each leg to the seat. In addition to heavy rounds well fixed the arms are rodded to the seats. By using these chairs the asylum has been able to dispense entirely with the old time settees, and it has not been found necessary to fasten any of the chairs to the floor. Through the wards generally arm chairs and rockers, varying in quality from wood seats to cane seats, and in price from \$5.00 to \$22.50 per dozen, were used, with no peculiarity except the rodding of the arms. For the dining rooms rather than the small uncomfortable wood seat chair, a very good looking and comfortable chair, with a perforated seat, was purchased at \$7.20 per dozen. Chairs were also purchased of the The Taylor Chair Company, and of Nelson, Matter & Co.

The blankets were made within seven miles of the Asylum, at Acme, by the Buller Brothers, and were furnished through Hamilton & Milliken of Traverse City, for fifty cents per pound, for all wool blankets. The same firm, Hamilton & Milliken, also furnished the larger portion of the towels and crash.

Carpets generally were furnished by Newcomb, Endicott & Co., of Detroit, at \$1.12½ per yard for Hartford & Bigelow's five frame body Brussels carpets, and sixty-five cents for Hartford all wool super ingrain. These carpets were made at the rate of five cents per yard for Brussels and three cents for ingrain. Quite a quantity of ingrain carpet by the roll, was also purchased from H. B. Claflin & Co., New York, at sixty cents, four per cent., ten days.

Newcomb, Endicott & Co., also made and furnished the sheets and pillow slips, made from Utica sheeting.

Crockery was furnished by Jones, McDuffee & Stratton, of Boston, the grade being Meakins stone china.

Comfortables were made and furnished by Taylor Woolfenden & Co. of Detroit, from Cocheco prints, with a fine quality of batting. This firm furnished also napkins and a large bill of rubber sheeting.

The woven wire mattresses were furnished by Ames & Frost, of Chicago.

J. K. Burnham & Co., of Detroit, furnished the bulk of the table linen and all table oil cloth.

The furniture for the administration building and miscellaneous for the wards was largely purchased of Nelson, Matter & Co., but also of other Grand Rapids firms—William A. Berkey, Widdicomb Furniture Company and Grand Rapids Chair Company.

Only in the cases of lounges and upholstered goods could furniture be purchased outside of Grand Rapids more advantageously, the former coming from R. Diemel & Brother, and the latter of Ketcham, Rothschild & Co., both of Chicago.

The clocks are twelve-inch dial spring clocks, at \$3.00 each, except the central regulator, which is a Seth Thomas, costing \$55. The plated ware

was divided between Charles H. Rollins, as agent of the Meriden Britannia Company and Van Heusen, Charles & Co., of Albany, N. Y. Flat ware, as knives, forks and spoons going to the former, and hollow ware, of which casters form nearly all the order, going to the latter. The sufficient reason for using plated ware throughout the wards is because the knives and forks do not become sharp, and therefore dangerous, as weapons.

Three sewing machines, the Remington, were purchased of S. P. Cushman, of Gibson, Pa., for net \$60.00.

To avoid the paste frame which usually accompanies small mirrors prices were asked for mirror plates, put up in hard wood mouldings, which are neat and durable, and can at any time be cleaned or refinished. The order was taken by C. F. Rice, of Chicago.

The cupboards and shelving for kitchens was done by the day, but the item (\$506.20) for boxes for patients' clothes was paid to J. E. Greilick, of Travers City, for work done on a competitive offer.

As food is all distributed from a general kitchen, proper dishes for conveying it and keeping it warm must be provided, and as the use is constant and service severe, only tinware, specially made from heavy tin, will long endure. This was made for the asylum by L. W. Loomis, of Cuyahoga Falls, Ohio.

FURNISHING OFFICES, CHAPEL AND DISPENSARY.

This class of furnishing was purchased in the same manner and time, and largely from the same firms as the furnishing for the wards, and requires little especial mention beyond the itemized cost of the articles, as follows:

Carpets.....	\$ 370 00
Hall stand.....	24 30
Settees.....	48 00
Chairs.....	101 85
Mirrors.....	36 00
Desks.....	46 60
Office tables.....	58 00
Parlor suites.....	153 90
Book cases.....	45 00
Account books.....	363 45
Stationery and blank books.....	84 83
Curtains.....	51 16
Letter press.....	10 00
Seats for chapel.....	422 69
Bible and hymn books.....	29 61
Pulpit.....	36 00
Organ for chapel.....	117 50
Curtains for chapel stage.....	73 92
Dispensary case.....	19 84
Shelf ware and implements for dispensary.....	126 78
Mail bag.....	10 00
Iron gate for telephone office.....	30 00
Freight of furniture.....	46 02
Labor, handling, putting together, &c.....	149 48
Miscellaneous.....	20 07
Total.....	<u>\$2,475 00</u>

The Chapel seats are well adapted. A folding chair in threes, capable of many arrangements within the room to suit the purposes of use; light, comfortable, durable and ornamental. Many designs and samples were submitted and rejected, until this, the third trial of the Michigan School Furniture Company, of Northville, Michigan, succeeded. There are three hundred and eighteen seats, the full uncrowded capacity of the Chapel room.

A complete outfit of record and account books and blank forms and books, made to meet the very special and complicated needs of the Asylum, was provided by J. W. Fales & Co., of Detroit.

INSTRUMENTS, BOOKS, PICTURES, ETC.

Two hundred and fifty-nine pictures and frames, complete, were purchased from C. F. Rice, Chicago, for a net sum of \$469.03. There are one hundred and two artotypes of good subjects and quality, eighty twenty-two inch by thirty-six inch oil paintings in three and one-half inch gilt frames, eighteen photographs and fifty-nine oleographs. The frames are mainly oil-rubbed hard wood, made especially for this purpose, a durable and neat frame that will bear washing and refinishing. In no other way could the same amount of money have added so much to the cheerfulness and appearance of the halls.

Books were purchased of Jansen, McClurg & Co., of Chicago; standard works of fiction, biography, history, &c., sufficient to supply present reading matter for the patients.

Eight organs were purchased—seven for the wards—from the Clough & Warren Organ Co., of Detroit, for \$500.00, four of which organs were properly chargeable to this fund. These organs were exceedingly cheap in price, and have proved very satisfactory in quality. The Chapel organ is a very powerful and fine instrument.

From this fund the microscope and accessories have been purchased; also scientific and surgical instruments.

The table of expenditures is as follows:

Books.....	\$377 76
Pictures.....	459 03
Four organs.....	232 65
Games.....	11 59
Microscope and accessories.....	270 00
Scientific instruments.....	244 52
Freight.....	32 45
Labor.....	17 25
Miscellaneous and labor.....	49 21
Laboratory outfit.....	84 36
Total.....	<u>\$1,778 82</u>

IMPLEMENTS, VEHICLES AND UTENSILS.

2 Jackson wagons.....	\$ 124 00
Cutter.....	25 25
4 pairs of bobs.....	92 00
Four-seated sleigh for patients' use.....	100 00

Sleigh for Express use	\$30 00
Express wagon	125 00
Buggy for Steward's use	122 00
Three-seat covered carriage for patients' use	450 00
Wheelbarrows	36 00
Spades, rakes, picks, scrapers, &c.	77 07
Harrows and plows	26 89
Cultivators	18 00
Spiral screw stump machine	155 00
Harnesses, whips and robes	284 50
Miscellaneous	99 92
Stanchions	37 50
Farmers' boiler for cooking swill	22 00
Total	<u>\$1,825 13</u>

STOCK AND HORSES.

Twenty-six cows	\$ 792 00
Sixty pigs	159 00
One bull	125 00
One boar	8 00
One ox team	100 00
Six horses	1,203 00
Total	<u>\$2,387 00</u>

ENGINES.

Two Armington & Sims engines, 42 horse power each	\$1,620 00
One " " " 30 " "	652 50
Three foundations for engines	275 00
Foundation boxes and bolts	165 40
Three selected leather endless belts	60 00
Total	<u>\$2,772 90</u>

SHAFTING, HANGERS, BELTING AND PULLEYS.

For these purposes a total of \$354.97 has been expended. This provides shafting, belting, etc., for the machinery within the carpenter shop, the laundry, kitchens and bakery.

By special appropriation \$7,340 was appropriated for implements, vehicles and utensils; stock, including farm and carriage horses, engines complete in place; and shafting, belting, pulleys, etc. This sum has all been expended for the purposes named, in detail, as shown above, namely:

For implements, etc.,	\$1,825 13
Stock and horses	2,387 00
Engines	2,772 90
Shafting, etc.,	354 97
Total	<u>\$7,340 00</u>

A larger sum could have been expended to advantage, notably, in the purchase of stock, horses and implements; but generally the sum was sufficient and the work has been well done.

OUTBUILDINGS.

For outbuildings the total sum of \$10,192.75 has been expended, all from the general appropriation as required by law. The items are:

Cow shed.....	\$538 77
Farm barn.....	2,244 24
Carriage barn.....	2,046 23
Temporary wood and coal shed.....	101 88
Bakery and refrigerator building.....	2,953 12
Ice house.....	268 22
Pig pens.....	169 97
Well house.....	188 84
Swill house.....	134 52
Dwelling house.....	1,268 83
Root cellar.....	278 13
Total.....	<u>\$10,192 75</u>

At the time the site was purchased the dwelling house stood in the position now occupied by the administration building. It was moved in three parts a distance of fifty-three rods by Mr. John A. Cook, of Traverse City, repaired and replaced in position at a total cost of \$575.00, and has since been occupied by the Superintendent as a dwelling house.

The Trustees anticipating the time in the near future when the asylum will be full, requested that if the funds could be spared for the purpose the dwelling house should be enlarged and fitted up for the reception of fifteen trustworthy female patients, of a class that would appreciate the advantages of home life, with home cooking and a family table. This was done at an expense of \$1,268.83 by raising the roof of the rear portion, adding a bath room, changing the wood shed into a kitchen and increasing the size of one bed room.

The well house, covering the well and containing the deep well pump, is of brick on a stone foundation, the foundation resting on the brick curbing of the well.

The swill house is a small brick building with a stone flag floor, placed just outside the kitchen building, for receiving, temporarily, the kitchen refuse, to await the removal once or twice each day to the pig pens. The space immediately about the building is heavily cemented so that no impurity can enter the ground.

The cow shed has room on the ground floor for twenty-six cows, and a hay loft above. This was built in the fall of 1885 to give temporary quarters when it was obvious that the main barn could not be constructed in time for the opening of the asylum.

The farm barn is a well constructed building, thirty-eight by sixty-five feet, with a stone basement beneath the entire barn, making stable room for forty-four cows. There is stable room on the first floor for seven horses.

The carriage barn was formed by moving, enlarging and remodeling the farm barn purchased with the asylum land. It has stalls for six horses, a wash room, a large harness and robe room, a hostler's room, ample space upon the first floor for vehicles, and a large storage loft above for hay. Also an enclosed space above for storage of sleighs in summer and carriages in winter. The foundations of these barns, and the stalls and mangers, were furnished by the Asylum. The general construction of each was by contract with Henry Green, of Traverse City—the farm barn for \$1,284, and the carriage barn for \$1,340.

The bakery and refrigerator building is a brick building with slate roof, having a total length of sixty-six feet six inches and width of thirty feet. One end is occupied for bakery purposes, containing two large ovens, a room and apparatus for frying doughnuts and a general work room for the baker. The other end of the building is divided into four rooms; a large meat room twenty-eight feet by fourteen; a milk and butter room, nine feet by thirteen feet six inches, a vegetable room eight feet by thirteen feet six inches, and an ante-room for cutting up meat, all ceiled with ash. The whole space above these rooms is occupied for storage of ice, the capacity being one hundred and fifty tons, and the arrangement is such that the warm air rises through openings in the center of the room and passes over the ice, becoming cooled thereby and losing its capacity to retain moisture, and falls to the floors of the rooms below in passages at the sides of the rooms. The space between the bakery building and kitchen is paved with flagging made of Portland cement, and is used as a driveway for daily stores to the kitchen. This impenetrable covering of the road and passageway prevents any possible contamination of the ground, so liable to occur from the kitchen wastes, washings, slops, &c. The space about the swill house is paved in a similar manner.

The root cellar, thirty by sixty feet, is placed thirty-six rods at the rear of the building in an excavation made in the side of a hill. The front is of stone, sides and rear are planked up, the plank supported by cedar poles. The covering is a shingle roof on plain boarding. From this root cellar the daily supply of vegetables will be taken to the kitchen vegetable room, there to be prepared for cooking.

FARM.

The farm consists of 339 91-100 acres of land, largely covered with hard wood—beech and maple. No attempt has been made to carry on farming operations beyond reducing one field from brush to meadow, keeping the fences in ordinary repair, clearing and ditching three acres of wood land and pasturing town cows. The items are:

Farm Debit.

Fencing	\$85 22
Ditching	25 20
Clearing land	135 09
Implements and utensils	56 36
Miscellaneous	105 83
Total	<u>\$407 70</u>

Farm Credit.

Pasture	\$572 59
Sand sold	19 25
Hay sold	96 13
<hr/>	
Total	\$687 97
<hr/>	

It will be seen that the net result is \$280.27 income from the farm.

In addition, and not showing within the above table, sixteen acres of land were cleared and put under cultivation, and thirty acres of land partially cleared by giving the wood thereon in payment for the clearing.

FENCING.

The Act of Appropriation contemplated fencing the farm from the general fund, and \$835.29 has been expended for that purpose. This has constructed two hundred and fifty-six rods of good post and board fence, and three hundred and thirty-six rods of planed and painted board fence of better appearance. This painted fence has been placed in front of the Asylum wherever the fencing becomes a pronounced feature in the landscape, and adds very much to the appearance of the grounds. The expense also includes all items incurred in repairing and removing fences during the progress of the building—quite a little sum. The larger portion of the new fencing has been made from lumber the logs for which were cut upon the Asylum farm, and were planed and edged in the Asylum carpenter shop. The posts have been cut wholly upon the Asylum farm, and, in part by the labor of patients. Additional fencing will be needed as successive tracts are brought under cultivation, but the farm will furnish the materials, and the patients largely the labor.

ROADS.

As with fences the Act of Appropriation required that all roads should be built from the general fund, and \$1,621.06 has been accordingly expended for this purpose. This does not complete all the roads which the necessities of the Asylum demand, and the remaining roads can come in time very largely from the labor of the patients. The roads built include a road leading to the barns, upon which considerable grading was required. The graveling of this road has not yet been done. Also a road was built from the front of the building around to reach the working departments in the rear, crossing a heavy fill. The remaining road constructed was from the main entrance of the building to the limits of the grounds towards the city, a distance of one hundred and thirty-three rods. In constructing this road a large quantity of earth was necessarily moved in order to make the grades conform with the levels of the ground, as they will be when finished. Before starting the work of road building it was necessary to adopt some general plan for the grading and improvement of the grounds, in order that every yard of earth moved should be moved from a place where it is not needed to a place where it is needed, Levels were accordingly taken over the entire front and ends of the building. These levels were platted, and the grades and levels determined from the plat. This plat also served as a guide

for grading so far as it has been accomplished. Now that the main roads are built the grading of the future can be definitely determined therefrom, and this work can progress during an interval of years, if necessary, as it can be reached by the labor of the patients within the building. A large portion of the shoveling in loading wagons was done by the patients. This work upon the grounds required much time and care, both in preparation and in execution, and could not have been advantageously and correctly done during the pressure of the months preceding the opening.

ARCHITECT.

Architect \$5,664.10.

The sums paid to the architect represent a percentage of one and one-half per cent. upon the cost of all work executed from the plans and specifications prepared by him. It will therefore be seen that the architect's plans covered construction to the value of \$377,606.67, embracing the contract of Wing, Morgan & Harford for stone, of Farr, Avery & Co., for brick, and the mason and carpenter contract of Bentleys & Nowlan.

SALARIES.

Salaries \$14,518.25.

The salaries paid by this fund are those of the Superintendant at \$2,500 per annum; the salary of a book-keeper at \$3.00 per day, and the salary of a foreman, during the working months, at from \$3.50 to \$4.00 per day.

INCIDENTALS.

Office building.....	\$ 229 00
Office furniture and furnishing.....	145 65
Office expenses, stationery, etc.....	439 25
Printing and advertising.....	870 36
3,000 plates for Reports.....	17 25
Examinations and surveys.....	88 00
Telegraph and traveling expenses.....	1,485 03
Fire ladders.....	150 00
Hose cart.....	58 00
Two lithograph stones for printing plates.....	180 00
Insurance.....	69 31
Miscellaneous.....	365 46
Total.....	<u>\$4,097 31</u>

The office building, of wood, sixteen by twenty-four feet, was occupied during the entire construction of the building for office purposes by the Superintendent and the Commissioners. It has since been removed, to form in the future a nucleus of some farm building. The office furniture consisted of chairs, desks, cases for plans, books, &c., all plain and only such as required by necessity.

All contracts over \$500 to be paid for from the building fund were required by law to be advertised for six weeks, which, as the contracts were numerous, incurred quite a large expense. Traveling expenses were largely incur-

red during the furnishing and fitting up of the building, in visiting the various markets to examine, compare and purchase goods, furniture, machinery, etc., etc. Ladders and hose carts properly belong to fire apparatus, but that fund having given out in the special appropriation the charges came in as incidentals.

THE ACCOUNTS.

From the outset full and complete accounts and records have been kept and have become the property of the Institution. In the expenditure of public money it is necessary to establish certain formulas or regulations, to serve both as safeguards against evil intent and as vouchers of right conduct and these safeguards and restrictions, unnecessary in usual private business, largely increase the amount of desk labor. While endeavoring to avoid the multiplication of accounts it has been the aim to record every act of administration, to show in minute detail the expenditures, to classify so as to show costs, purposes and results, and to know each day the status of any account or fund, and thus be able to show to any citizen of the State that of which he has a right to inquire.

This work of book-keeping has been wholly done by Mr. John Goode—faithfully and accurately done. In addition to the general duties of the office Mr. Goode has done much work as draftsman, and has helped in all departments, through his indefatigable capacity for intelligent work.

INSPECTION OF WORK.

During the whole progress of the work the inspection has been constant, beginning and ending with each day's labor. In designing work or specifying work or materials great care has been exercised to fully and exactly show and describe that which was to be done or furnished. Then after prices had been submitted and accepted the fulfillment of the agreement, which both parties understood alike, was rigidly exacted.

This daily work of inspection has been largely done by Mr. C. M. Prall, a practical builder and contractor of unquestioned integrity, and possessing a valuable fund of technical knowledge in his specialty. Mr. Prall has also acted as general foreman of all work performed by hired labor, and has done the main work in the preparation of plans for the outbuildings.

In closing this report I desire to express my great obligation to the Board of Commissioners. A firm and consistent support has greatly lightened my labors. I always felt certain that the Board stood back of me in any right course, and would adhere to right without considerations of policy, politics, individual preferences or personal ends. Without this support or with dissensions in the Board I could not in my impaired state of health have continued in the work. Gentlemen of the Board I thank you.

Respectfully submitted.

C. M. WELLS, *Superintendent.*

TREASURER'S REPORTS.

For the Fiscal Year ending September 30, 1885.

NORTHERN MICHIGAN ASYLUM, }
Traverse City, Michigan, October 1, 1885. }

To the Board of Commissioners of the Northern Asylum for the Insane:

Your treasurer begs leave to submit the following report for the fiscal year ending September 30, 1885:

Funds on hand at date of last report, Oct. 1, 1884..	\$236 34	
Received from all sources.....	89,116 70	
Paid vouchers.....		\$86,942 80
Balance in treasury.....		2,410 24
Totals	<u>\$89,353 04</u>	<u>\$89,353 04</u>

REUBEN HATCH, *Treasurer.*

For the Fiscal Year Ending September 30, 1886.

TRAVERSE CITY, MICHIGAN, }
October 1, 1886. }

To the Board of Commissioners of the Northern Asylum for the Insane:

Your treasurer begs to submit the following report for the fiscal year ending September 30, 1886:

Funds on hand at date of last report, Oct. 1, 1885	\$2,410 24	
Received from all sources.....	\$180,117 90	
Paid vouchers		\$177,877 74
Balance in treasury.....		4,650 40
Totals	<u>\$182,528 14</u>	<u>\$182,528 14</u>

Respectfully submitted,

REUBEN HATCH, *Treasurer.*

For the Month of October, 1886.

TRAVERSE CITY, MICHIGAN, {

November 6, 1886.

To the Board of Commissioners of the Northern Asylum for the Insane :

Your treasurer begs leave to submit this, his final report :

Funds on hand at date of last report, Oct. 1, 1886	----	\$4,650	40	
Received from all sources	-----	372	72	
Paid vouchers	-----			\$5,001 94
Amount this day returned to State treasury	-----			21 18
Totals	-----	<u>\$5,023</u>	<u>12</u>	<u>\$5,023 12</u>

Respectfully submitted,

REUBEN HATCH, Treasurer.

TREASURER’S SETTLEMENTS WITH BOARD OF COMMISSIONERS.

TRAVERSE CITY, MICHIGAN, {

December 29, 1885.

The Board of Commissioners for the Northern Asylum for the Insane has this day examined the books and report of receipts and disbursements of Reuben Hatch, treasurer of the Northern Asylum, for the fiscal year ending September 30, 1885, and carefully compared the items therein with the books and accounts of C. M. Wells, secretary, and find the same to correspond, and settlement is hereby made with the said Reuben Hatch, treasurer, on that basis.

The Board of Commissioners has received from Reuben Hatch, treasurer, vouchers Nos. 174 to 353 inclusive, representing a total disbursement of \$86,942.80, being all vouchers paid by him during the fiscal year ending September 30, 1885, and on which the foregoing settlement is based, leaving on hand a cash balance of \$2,410.24.

THOS. T. BATES,

Chairman Board of Commissioners.

TRAVERSE CITY, MICHIGAN, {

October 22, 1886.

The Board of Commissioners for the Northern Asylum for the Insane has this day examined the books and report of receipts and disbursements of Reuben Hatch, treasurer of the Northern Asylum, for the fiscal year ending September 30, 1886, and carefully compared the items therein with the books and accounts of C. M. Wells, secretary, and find the same to correspond, and a settlement is hereby made with the said Reuben Hatch, treasurer, on that basis.

The Board of Commissioners has this day received from Reuben Hatch, treasurer, vouchers Nos. 354 to 708 inclusive, representing a total disbursement of \$177,877.74, being all vouchers paid by him during the fiscal year

ending September 30, 1886, and on which the foregoing settlement is based, leaving on hand a cash balance of \$4,650.40.

C. M. WELLS, *Secretary.*

THOS. T. BATES,
Chairman Board of Commissioners.

KALAMAZOO, MICHIGAN, {
November 10, 1886. }

The Board of Commissioners for the Northern Asylum for the Insane has this day examined the books and report of receipts and disbursements of Reuben Hatch, treasurer of the Northern Asylum, for the month ending October 31, 1886, and carefully compared the items therein with the books and accounts of C. M. Wells, secretary, and find the same to correspond, and settlement is hereby made with the said Reuben Hatch, treasurer, on that basis.

The Board of Commissioners has received from Reuben Hatch, treasurer, vouchers Nos. 709 to 739 inclusive, representing a total disbursement of \$5,001.94, being all vouchers paid by him during the month of October, 1886, and to the final dissolution of the Board.

The Board has also received from Reuben Hatch, treasurer, receipt for \$21.18, returned from the fund for "scientific instruments" to the State Treasury, and also for preservation at the Asylum, his record and account books.

The Board further finds that the treasurer had on hand October		
1, 1886.....		\$4,650 40
Received during October, 1886, State treasurer	\$326 39	
Farm products	46 33	
	<hr/>	372 72
Total		<hr/> \$5,023 12
Disbursed vouchers 709 to 739 inclusive	\$5,001 94	
Returned to State treasury.....	21 18	
	<hr/>	<hr/> \$5,023 12

THOS. T. BATES, *Chairman.*

C. M. WELLS, *Secretary.*

SETTLEMENTS WITH BOARD OF STATE AUD-
ITORS AND ACCOUNTS CURRENT.

ABSTRACTS

OF ACCOUNTS CURRENT OF RECEIPTS AND DISBURSEMENTS AT THE NORTHERN
MICHIGAN ASYLUM, ON ACCOUNT OF BUILDING AND SPECIAL APPRO-
PRIATIONS FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1885.

*The State of Michigan in account with C. M. Wells, Secretary of the Northern Mich-
igan Asylum, monthly, for the fiscal year 1885.*

October, 1884.

CREDIT.

By balance of building fund on hand October 1, 1884.....	\$236 34	
cash for building fund from State Treasury.....	7,000 00	
“ “ “ “ “ other sources, Abstract Bb.....	27 99	
		\$7,264 33

DEBIT.

To disbursements building fund, Abstract B.....	\$6,485 26	
balance of building fund to new account.....	779 07	
		\$7,264 33

November, 1884.

CREDIT.

By balance of building fund on hand November 1, 1884.....	\$779 07	
cash for building fund from State Treasury.....	6,000 00	
“ “ “ “ “ other sources, Abstract Bb.....	31 18	
		\$6,810 25

DEBIT.

To disbursements building fund, Abstract B.....	\$68 50	
balance of building fund to new account.....	6,741 75	
		\$6,810 25

December, 1884.

CREDIT.

By balance of building fund on hand December 1, 1884.....	-----	\$6,741 75
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DEBIT.

To disbursements building fund, Abstract B.....	\$6,727 37	
balance of building fund to new account.....	14 38	
	-----	\$6,741 75

January, 1885.

CREDIT.

By balance of building fund on hand January 1, 1885.....	\$14 38	
cash for building fund from State Treasury.....	1,500 00	
	-----	\$1,514 38

DEBIT.

To disbursements building fund, Abstract B.....	\$1,073 86	
balance of building fund to new account.....	440 52	
	-----	\$1,514 38

February, 1885.

CREDIT.

By balance of building fund on hand February 1, 1885.....	\$440 52	
cash for building fund from other sources, Abstract Bb.....	4 58	
	-----	\$445 10

DEBIT.

To balance of building fund to new account.....	-----	\$445 10
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March, 1885.

CREDIT.

By balance of building fund on hand March 1, 1885.....	-----	\$445 10
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DEBIT.

To balance of building fund to new account.....	-----	\$445 10
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April, 1885.

CREDIT.

By balance of building fund on hand April 1, 1885.....	\$445 10	
cash for building fund from State Treasury.....	4,200 00	
“ “ “ “ “ other sources, Abstract Bb.....	4 57	
		\$4,649 67

DEBIT.

To balance of building fund to new account.....		\$4,649 67
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May, 1885.

CREDIT.

By balance of building fund on hand May 1, 1885.....		\$4,649 67
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DEBIT.

To disbursements building fund, Abstract B.....	\$3,755 59	
balance of building fund to new account.....	894 08	
		\$4,649 67

June, 1885.

CREDIT.

By balance of building fund on hand June 1, 1885.....	\$894 08	
cash from State Treasury :		
building fund.....	9,000 00	
sewers, drains and cisterns.....	1,600 00	
fire protection.....	515 00	
ventilation, etc.....	1,500 00	
grading.....	600 00	
supplying asylum with water, etc.....	850 00	
cash from other sources, Abstract Bb.....	28 80	
		\$14,987 88

DEBIT.

To disbursements :		
building fund.....	\$10,960 28	
plumbing, hot and cold water distribution, etc.....	1,000 65	
sewer, drains and cisterns.....	925 87	
ventilation, etc.....	1,252 39	
grading.....	719 34	
telephone communication, etc.....	5 95	
supplying asylum with water, etc.....	50 00	
balance on hand to new acccount.....	73 40	
		\$14,987 88

July, 1885.

CREDIT.

By cash on hand July 1, 1885.....		\$73 40
cash from State Treasury :		
building fund.....	\$10,000 00	
heating apparatus, etc.....	12,400 00	
plumbing, hot and cold water distribution, etc.....	3,200 00	
sewers, drains and cisterns.....	1,830 00	
		27,430 00
cash from other sources, Abstract Bb.....		13 22
		\$27,516 62

DEBIT.

To disbursements :		
building fund.....	\$6,976 44	
heating apparatus, etc.....	5,090 98	
plumbing, hot and cold water distribution, etc.....	1 00	
sewers, drains and cisterns.....	965 27	
ventilation, etc.....	90 00	
grading.....	483 60	
telephone communication, etc.....	12 00	
supplying asylum with water.....	719 57	
		\$14,338 86
balance on hand to new account.....		13,177 76
		\$27,516 62

August, 1885.

CREDIT.

By balance on hand August 1, 1885.....		\$13,177 76
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DEBIT.

To disbursements :		
Building fund.....	\$1,160 05	
Heating apparatus, etc.....	2,835 29	
Plumbing, hot and cold water distribution, etc.....	1,602 33	
Sewers, drains and cisterns.....	444 93	
		\$6,042 60
balance on hand to new account.....		7,135 16
		\$13,177 76

September, 1885.

CREDIT.

By balance on hand September 1, 1885.....		\$7,135 16
cash from State Treasury:		
building fund.....	\$7,500 00	
furnishing wards, administration building, etc.....	1,500 00	
cooking, baking, laundry, iron working, etc., apparatus.....	1,000 00	
heating apparatus, etc.....	8,700 00	
plumbing, hot and cold water distribution, etc.....	5,500 00	
fire protection.....	1,700 00	
grading.....	1,000 00	
supplying asylum with water.....	1,900 00	
		28,800 00
cash from other sources, abstract Bb.....		11 36
		\$35,946 52

DEBIT.

To disbursements:		
building fund.....	\$9,318 21	
furnishing wards, administration building, etc.....	1,167 66	
cooking, baking, laundry, iron working apparatus, etc.....	1 80	
heating apparatus, etc.....	13,126 49	
plumbing, hot and cold water distribution, etc.....	5,609 30	
sewers, drains and cisterns.....	388 08	
fire protection.....	2,150 00	
telephone communication, etc.....	12 00	
supplying asylum with water, etc.....	1,762 74	
		\$33,536 28
balance on hand to new account.....		2,410 24
		\$35,946 52

SETTLEMENT.

The State of Michigan in Account with C. M. Wells, Secretary of the Northern Michigan Asylum, for the fiscal year ending September 30, 1885.

CREDIT.

By balance on hand October 1, 1884.....		\$236 34
cash from State Treasury :		
building appropriation.....	\$45,200 00	
furnishing wards, admission building, etc.....	1,500 00	
cooking, laundry, baking, etc., apparatus.....	1,000 00	
heating apparatus, etc.....	21,100 00	
plumbing, hot and cold water distribution, etc.....	8,700 00	
sewers, drains and cisterns.....	3,430 00	
fire protection.....	2,215 00	
ventilation, etc.....	1,500 00	
grading.....	1,600 00	
supplying asylum with water, etc.....	2,750 00	88,995 00
		121 70
cash from other sources.....		\$89,353 04

DEBIT.

To disbursements :		
building appropriation.....	\$46,525 56	
furnishing wards, administration building, etc.....	1,167 66	
cooking, laundry, baking, etc., apparatus.....	1 80	
heating apparatus, etc.....	21,052 76	
plumbing, hot and cold water distribution, etc.....	8,213 28	
sewers, drains and cisterns.....	2,724 15	
fire protection.....	2,150 00	
ventilation, etc.....	1,342 39	
grading.....	1,202 94	
telephone communication, etc.....	29 95	
supplying asylum with water, etc.....	2,532 31	\$86,942 80
cash on hand.....		2,410 24
		\$89,353 04

OFFICE OF THE BOARD OF STATE AUDITORS. }
Lansing, May 26, 1886. }

I hereby certify that the Board of State Auditors this day examined the within account current of receipts and disbursements of C. M. Wells, secretary of the Northern Michigan Asylum for the fiscal year ending September 30, 1885, and carefully compared the vouchers submitted to the Board with the account current, and find the same to correspond with the books of the Auditor General, and have settled with said secretary on that basis.

H. A. CONANT,

Chairman of Board of State Auditors.

ABSTRACTS

OF ACCOUNTS CURRENT OF RECEIPTS AND DISBURSEMENTS AT THE NORTHERN MICHIGAN ASYLUM ON ACCOUNT OF BUILDING AND SPECIAL APPROPRIATIONS FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1886.

The State of Michigan in account with C. M. Wells,, Secretary of the Northern Michigan Asylum, monthly, for the fiscal year 1886.

October, 1885.

CREDIT.

By balance on hand October 1, 1885.....	\$2,410 24	\$2,454 95
cash from other sources, abstract Bb.....	44 71	

DEBIT.

To disbursements, building fund.....	\$227 21	\$2,454 95
cash on hand to new account.....	2,227 74	

November, 1885.

CREDIT.

By balance on hand November 1, 1885.....		\$2,227 74
cash from State Treasury :		
building fund.....	\$72,000 00	
furnishing wards, administration building, etc.....	15,000 00	
cooking, baking, laundry, iron working apparatus, etc.....	5,150 00	
heating apparatus, etc.....	3,000 00	
plumbing, hot and cold water distribution, etc.....	4,675 00	
fire protection.....	1,900 00	
telephone communication, etc.....	1,350 00	
		103,075 00
cash from other sources, abstract Bb.....		13 14
		\$105,315 88

DEBIT.

To disbursements :		
building fund.....	\$73,089 40	
furnishing wards, administration building, etc.....	16,092 23	
furnishing offices, chapel and dispensary.....	295 95	
cooking, baking, laundry, iron working apparatus, etc.....	4,947 04	
heating apparatus, etc.....	2,530 13	
plumbing, hot and cold water distribution, etc.....	1,431 15	
sewers, drains and cisterns.....	628 30	
implements, vehicles, stock, etc.....	525 00	
fire protection.....	1,835 00	
ventilation, etc.....	27 17	
grading.....	300 00	
telephone communication, etc.....	4 31	
supplying asylum with water, etc.....	217 69	
		\$101,923 37
balance on hand to new account.....		3,392 51
		\$105,315 88

RECEIPTS AND DISBURSEMENTS.

75

December, 1885.

CREDITS.

By balance on hand December 1, 1885.....		\$3,392 51
cash from State Treasury :		
building fund.....	\$7,000 00	
furnishing wards, administration building, etc.....	10,000 00	
furnishing offices, chapel and dispensary.....	1,200 00	
heating apparatus, etc.....	8,000 00	
implements, vehicles, stock, etc.....	3,000 00	
sidewalks and airing courts.....	800 00	
		30,000 00
		\$33,392 51

DEBIT.

To disbursements :		
building appropriation.....	\$3,489 19	
furnishing wards, adm'n building, etc.....	10,334 88	
furnishing offices, chapel and dispensary.....	689 53	
cooking, baking, laundry, iron working, etc., apparatus.....	941 06	
heating apparatus, etc.....	7,223 27	
plumbing, hot and cold water distribution, etc.....	3,730 57	
sewers, drains and cisterns.....	77 55	
implements, vehicles, etc.....	2,249 77	
fire protection.....	130 00	
grading.....	97 06	
telephone communication, etc.....	1,395 00	
sidewalks and airing courts.....	539 20	
		\$30,907 08
balance on hand to new account.....		2,485 43
		\$33,392 51

January, 1886.

CREDIT.

By balance on hand January 1, 1886.....		\$2,485 43
cash from State Treasury :		
building fund.....	\$10,000 00	
furnishing wards, adm'n building, etc.....	3,875 00	
furnishing offices, chapel and dispensary.....	800 00	
cooking, baking, laundry, iron working etc., apparatus.....	800 00	
implements, vehicles, stock, etc.....	2,500 00	
ventilation, etc.....	1,000 00	
scientific instruments, books, pictures, etc.....	825 00	
		19,800 00
cash from other sources, abstract Bb.....		15 00
		\$22,300 43

DEBIT.

To disbursements :		
building fund.....	\$9,002 51	
furnishing wards, adm'n building, etc.....	2,033 70	
furnishing offices, chapel and dispensary.....	964 01	
cooking, laundry, baking, iron working, etc., apparatus.....	406 41	
heating apparatus, etc.....	195 26	
implements, vehicles, stock, etc.....	2,421 80	
ventilation, etc.....	937 60	
telephone communication, etc.....	151 88	
sidewalks and airing courts.....	38 81	
scientific instruments, books, pictures, etc.....	10 79	
		\$16,162 77
balance on hand to new account.....		6,137 66
		\$22,300 43

February, 1886.

CREDIT.

By balance on hand February 1, 1886.....	\$6,137 66	
balance overdrawn to new account.....	292 42	
		\$6,430 08

DEBIT.

To disbursements :		
building fund.....	\$1,884 65	
furnishing wards, administration building, etc.....	110 61	
furnishing offices, chapel and dispensary.....	102 86	
cooking, baking, laundry, iron working, etc., apparatus.....	316 70	
heating apparatus, etc.....	3,023 96	
implements, vehicles, stock, etc.....	150 88	
ventilation, etc.....	11 50	
scientific instruments, books, pictures, etc.....	828 92	
		\$6,430 08

March, 1886.

CREDIT.

By cash from State Treasury :		
building fund	\$1,000 00	
heating apparatus.....	3,000 00	
telephone communication, etc.....	355 00	
		\$4,355 00

DEBIT.

To balance overdrawn.....		\$292 42
disbursements :		
building fund.....	\$582 14	
furnishing wards, adm'n building, etc	521 92	
furnishing offices, chapel and dispensary.....	199 82	
cooking, baking, laundry, iron working, etc., apparatus.....	93 02	
heating apparatus, etc.....	1,232 44	
implements, vehicles, stock, etc	480 29	
ventilation, etc.....	106 55	
telephone communication, etc.....	112 07	
scientific instruments, books, pictures, etc.....	279 81	
		3,608 06
		\$3,900 48
balance on hand to new account.....		454 52
		\$4,355 00

RECEIPTS AND DISBURSEMENTS.

77

April, 1886.

CREDIT.

By balance on hand April 1, 1886		\$454 52
cash from State Treasury :		
building fund	\$1,000 00	
furnishing offices, chapel and dispensary	475 00	
heating apparatus, etc	750 00	
implements, vehicles, stock, etc	500 00	
scientific instruments, books, pictures, etc	500 00	
		3,225 00
		<u>\$3,679 52</u>

DEBIT.

To disbursements :		
building fund	\$1,920 58	
furnishing wards, adm'n building, etc	114 00	
furnishing offices, chapel and dispensary	25 13	
cooking, baking, laundry, iron working, etc., apparatus	4 30	
heating apparatus, etc	345 98	
implements, vehicles, stock, etc	91 54	
telephone communication, etc	4 00	
scientific instruments, books, pictures, etc	253 02	
		\$2,758 55
balance on hand to new account		920 97
		<u>\$3,679 52</u>

May, 1886.

CREDIT.

By balance on hand May, 1, 1886	\$920 97	
cash from State Treasury :		
building fund	1,750 00	
cooking, baking, laundry, etc., apparatus	500 00	
implements, vehicles, stock, etc	1,100 00	
sidewalks and airing courts	460 00	
		<u>\$4,730 97</u>

DEBIT.

To disbursements :		
building fund	\$319 59	
furnishing offices, chapel and dispensary	28 25	
heating apparatus, etc	109 21	
implements, vehicles, stock, etc	165 00	
ventilation	34 13	
telephone communication, etc	7 79	
sidewalks and airing courts	170 24	
scientific instruments, books, pictures, etc	18 75	
		\$852 96
balance on hand to new account		3,878 01
		<u>\$4,730 97</u>

June, 1886.

CREDIT.

By balance on hand June 1, 1886	-----	\$3,878 01
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DEBIT.

To disbursements :		
building appropriation	\$286 00	
furnishing office, chapel and dispensary	80 23	
cooking, baking, laundry, etc., apparatus	317 62	
heating apparatus, etc	848 59	
implements, vehicles, stock, etc	909 00	
ventilation, etc	14 88	
sidewalks and airing courts	187 28	
scientific instruments, books, pictures, etc	7 87	
		\$2,651 47
balance on hand to new account	-----	1,226 54
		\$3,878 01

July, 1886.

CREDIT.

By balance on hand July 1, 1886	-----	\$1,226 54
cash from State Treasury :		
building fund	\$3,000 00	
heating apparatus, etc	3,400 00	
implements, vehicles, stock, etc	240 00	
ventilation, etc	1,070 00	
scientific instruments, etc	475 00	
		8,185 00
cash from other sources	-----	11 05
		\$9,422 59

DEBIT.

To disbursements :		
building fund	\$2,446 49	
furnishing offices, chapel and dispensary	79 22	
cooking, baking, laundry, iron working, etc., apparatus	461 00	
heating apparatus, etc	891 70	
implements, vehicles, stock, etc	226 82	
ventilation, etc	15 05	
sidewalks and airing courts	212 00	
scientific instruments, etc	270 00	
		\$4,602 28
balance on hand to new account	-----	4,820 31
		\$9,422 59

79

CREDIT.

DEBIT.

CREDIT.

DEBIT.

To disbursements:		
balance overdrawn	\$548 40	
building appropriation	2,019 77	
cooking, baking, laundry, etc., apparatus	141 55	
heating apparatus	103 98	
implements, vehicles, stock, etc	119 90	
		\$2,933 60
balance on hand to new account		4,650 40
		<u>\$7,584 00</u>

SETTLEMENT.

The State of Michigan in account with C. M. Wells, Secretary of the Northern Michigan Asylum, for the fiscal year ending September 30, 1886.

CREDIT.

By balance on hand October 1,1885		\$2,410 24
cash from State Treasury:		
building appropriation.....	\$102,368 00	
furnishing wards, adm'n building, etc	28,875 00	
furnishing offices, chapel and dispensary.....	2,475 00	
cooking, laundry, baking, etc., apparatus.....	6,660 00	
heating apparatus, etc.....	18,906 00	
plumbing, etc	4,675 00	
implements, vehicles, stock, etc	7,340 00	
fire protection.....	1,900 00	
ventilation, etc.....	2,070 00	
telephone communication, etc.....	1,705 00	
sidewalks and airing courts.....	1,260 00	
scientific instruments, books, etc.....	1,800 00	
cash from other sources, Abstract Bb.....	83 90	
		180,117 90
		\$182,528 14

DEBIT.

To disbursements:		
building appropriation.....	\$98,665 45	
furnishing wards, adm'n building, etc	29,207 34	
furnishing offices, chapel and dispensary.....	2,475 00	
cooking, baking, laundry, etc., apparatus.....	7,658 20	
heating apparatus, etc.....	18,258 34	
plumbing, etc.....	5,161 72	
sewers, drains and cisterns.....	705 85	
fire protection.....	1,965 00	
implements, vehicles, stock, etc	7,340 00	
ventilation, etc.....	1,221 88	
grading.....	397 06	
telephone communication, etc.....	1,675 05	
sidewalks and airing courts.....	1,260 00	
scientific instruments, etc.....	1,669 16	
supplying asylum with water, etc.....	217 69	
balance on hand to new account.....	4,650 40	
		\$182,528 14

OFFICE OF BOARD OF STATE AUDITORS, }
Lansing, Dec. 29, 1886. }

I hereby certify that the Board of State Auditors this day examined the within account current of the receipts and disbursements of C. M. Wells, Secretary of the Northern Michigan Asylum, for the fiscal year ending September 30, 1886, and carefully compared the vouchers submitted to the board with the account current, and find the same to correspond with the books of the Auditor General, and have settled with said secretary on that basis.

H. A. CONANT,
Chairman of the Board of State Auditors.

ABSTRACT

OF ACCOUNT CURRENT OF RECEIPTS AND DISBURSEMENTS AT THE NORTHERN MICHIGAN ASYLUM, ON ACCOUNT OF BUILDING AND SPECIAL APPROPRIATIONS FOR THE MONTH ENDING OCTOBER 31, 1886.

CREDIT

By balance on hand October 1, 1886.....	\$4,650 40	
cash from State Treasury.....	326 39	
“ “ other sources, Abstract Bb.....	46 33	
		\$5,023 12

DEBIT.

To disbursements:		
building appropriation.....	\$3,191 65	
heating apparatus, etc.....	694 90	
ventilation, etc.....	1,005 73	
scientific instruments, etc.....	109 66	
		\$5,001 94
cash returned to State Treasury.....		21 18
		\$5,023 12

OFFICE OF THE BOARD OF STATE AUDITORS, }
Lansing, Dec. 29, 1886. }

I hereby certify that the Board of State Auditors this day examined the within account current of receipts and disbursements of C. M. Wells, Secretary of the Northern Michigan Asylum, for the month ending October 31, 1886, and carefully compared the vouchers submitted to the board with the account current, and find the same to correspond with the books of the Auditor General; and have settled with said secretary on that basis.

H. A. CONANT,
Chairman of the Board of State Auditors.

EXAMINATION OF PLANS.

Examination of plans for heating, plumbing and sewerage of the Northern Michigan Asylum, by the Board of Corrections and Charities, and the State Board of Health, reported in accordance with Act No. 206, session of 1881, as follows:

REPORT OF BOARD OF CORRECTIONS AND CHARITIES.

STATE OF MICHIGAN,
SECRETARY'S OFFICE, BOARD OF CORRECTIONS AND CHARITIES, }
Lansing, June 17, 1885.

To the Board of Trustees of the Northern Asylum, Traverse City:

GENTLEMEN,—The Board of Corrections and Charities having, through Commissioner Van Deusen, carefully examined the plans for heating and ventilating the asylum, I am instructed to say that the entire Board concur in the approval of the same, as expressed to you verbally by Commissioner Van Deusen.

By order of the Board.

WITTER J. BAXTER.
Secretary.

REPORT OF STATE BOARD OF HEALTH..

Examination of plans for heating, plumbing and sewerage of the Northern Asylum for the Insane at Traverse City.

May 7, 1885, the following letter was received from the Superintendent of the Asylum for the Insane at Traverse City:

NORTHERN ASYLUM FOR THE INSANE, }
Traverse City, Mich., May 5, 1885.

Henry B. Baker, Secretary State Board of Health, Lansing, Mich.:

SIR,—At a meeting of the Board of Commissioners of the Northern Asylum, held in Lansing, April 29, 1885, I was instructed to invite the State Board of Health and the Board of Corrections and Charities to meet with the Board of Commissioners at Traverse City, at 9 A. M., Wednesday, June 3, 1885, for the purpose of examining the Asylum plans for heating, plumbing and sewerage, as required by law.

The late date is necessitated both by the absence in New Orleans of your Board, and your desire, expressed to me through the Secretary of the Board of Corrections and Charities, for a long notice.

Hoping for a full attendance on the part of your Board,

I remain,

Yours very truly,

C. M. WELLS,
Supt. and Sec'y.

In accordance with this request, a meeting of the State Board of Health at Traverse City, at 9 A. M., June 3, 1885, was called by the President, to examine plans for the heating, plumbing and sewerage of the Northern Asylum for the Insane, and for the transaction of such other business as might properly come before the Board at that time.

In pursuance of the above invitation, and the call of its President, the State Board of Health met at Traverse City, June 3, and examined the Asylum building, grounds and surroundings, and the plans for heating and plumbing. No detailed plan for the sewerage was presented.

All the members of the Board of Commissioners of the Asylum were present, and through their kindness and that of the Superintendent, Mr. C. M. Wells, the inspection by this Board was courteously facilitated.

The following are the suggestions by the State Board of Health:

GENERAL SUGGESTIONS.

The building is upon high, gravelly ground, and the natural drainage of the site would seem to be good. This same porosity of the earth down to the ground-water, which is said to be about thirty or forty feet under the sand and gravel, renders it of extremely great consequence that so long as the water for use in the asylum shall be taken from the earth, or from springs from the earth, the porous water-shed in the rear of and in the vicinity of the asylum be faithfully guarded from causes of sickness, such as privies, or contamination by leaching of sewage; because the cause of typhoid fever might easily pass down through such a soil. No detailed plan for water-supply was formally presented to this Board for approval, yet, informally, the subject was mentioned, and the foregoing suggestion is respectfully offered, as also that the sewage be conveyed in a water-tight conduit to the Boardman river.

THE CHAPEL BUILDING.

According to the plans and specifications, the fresh air inlets of the chapel building are to consist of eight openings, each 6x12 inches, cut through the outside wall, and diminished by a register on the inside, so that the opening is about 4x12. The heating coil is to be placed just over the inner opening. The foul air is to be removed:

1. By two ventilating shafts, each with a sectional area of two square feet, placed on either side of the stage, with an opening into each placed two feet above the floor.

2. By a round opening in the ceiling, three feet in diameter, with a garret over it, and an opening of about the same capacity communicating with the open air through the roof.

The aggregate sectional area of the fresh-air inlets is about two and two-thirds feet. Estimating the velocity of the incoming air at ten feet per second—a velocity not usually attained without artificial means for producing a draft, the air supply would be sufficient for scarcely fifty persons, calculating two thousand feet for each person, which is certainly a very moderate estimate for persons in health, and rather too small an estimate for the class of persons usually found in an insane asylum. The capacity of the room being 300, it is evident that a larger provision for fresh air should be made.

This may be very easily accomplished by running two lateral ducts from the pipe shaft which passes beneath the chapel building, and which, as suggested by the Superintendent, may be used as a fresh air duct. It is suggested that the openings of these ducts be on either side of the entrance to the chapel room, and that each opening should have a sectional area of not less than six square feet. The method of removing the air seems to us objectionable in the following particulars:

1. The opening in the ceiling will remove the warm fresh air which passes at once to the ceiling as soon as it enters the room, and in doing so will be likely to antagonize the other two ventilating shafts.

2. The opening into the ventilating shafts should be at the floor, instead of two feet above it.

3. If the opening in the ceiling is closed, which we would recommend, and which we think will be found necessary, in order to heat the building, much larger provision for the removal of foul air will be required.

We would suggest the addition of a shaft having a sectional area of not less than twelve square feet, to be placed back of the stage and communicating with the chapel room by a long register of equal capacity, placed at the floor in the front of the stage. A steam coil of sufficient size to insure constant draft should be placed in the bottom of this shaft.

The aggregate amount of heating surface for the chapel room, as shown by the plans, is 700 square feet. While this is ample according to the usual rules for estimating employed by steam fitters, who calculate the amount of heating surface according to the amount of space to be heated, it will be quite insufficient to heat the quantity of air which will be furnished, provided the suggestions made respecting the ventilation are adopted. It is recommended that a coil, containing not less than 250 feet of heating surface (indirect), be placed at each of the fresh air openings suggested above.

VENTILATION OF MAIN BUILDING.

In the main building the foul air is collected from the vertical ducts by horizontal trunks along the floor of the garret and communicating at various central points with openings through the roof. This arrangement is perhaps in some respects an improvement over that shown by the plans, when first examined by the Board, and under favorable circumstances will probably secure efficient ventilation, but is certainly more liable to serious and harmful interference, from the opening of windows in rooms of different stories, than the plan suggested by members of the Board at the previous meeting, which would secure a separate ventilating duct for each room.

It is evident that the greatest possible degree of isolation of individual rooms, as regards air supply, in an institution of this sort, is highly desirable. If many rooms communicate with a common chamber in the garret, the opening of a window under certain circumstances or conditions of the wind would expose the inmate of the room to foul or contaminated air, and thus act as an efficient means of spreading infectious diseases.

In some parts of the building the horizontal trunks are so crooked, in some instances turning four or five square corners, that the draft in the portions most remote from the ventilators must be very greatly diminished, and as the system of heating employed is wholly "indirect," and hence dependent upon ventilation for equal distribution, it is evident that those portions

of the building most remote from the ventilators will be insufficiently ventilated, as well as poorly heated. It is feared that this difficulty will be experienced in parts of the building, and especially in the portion known as "B transverse," and the corresponding one known as "2 south," in each of which there is such a degree of crookedness of the horizontal trunk that it seems highly necessary that an additional ventilator should be constructed in the rear of the one now existing.

THE VENTILATION OF WATER CLOSETS.

As shown by the plans, the ventilating ducts from the water closets lead to the common collecting trunks and in some instances at points so remote from the ventilator, which leads through the roof, as to make the draft very defective, and render contamination of the air of portions of the buildings with air from the water-closets not only possible, but probable. Each water-closet should be supplied with a separate ventilating duct, not less than 8x8 inches in size, and should be independent, and constantly heated to secure a good and permanent draft. The opening of this duct should be just above the closet bowl, and on the same side of the room, instead of on the opposite side, as shown in the plans.

On the whole, the plans show great care on the part of the architect and superintendent, as regards sanitary matters, and are worthy of high commendation.

The foregoing is respectfully transmitted by

HENRY B. BAKER,
Secretary.

TRANSCRIPTS FROM PROCEEDINGS OF BOARD
OF COMMISSIONERS.

NORTHERN MICHIGAN ASYLUM, }
June 4, 1885. }

On motion, the following resolution was adopted:

WHEREAS, The plans for heating, plumbing and sewerage prepared by C. M. Wells for the Northern Asylum for the Insane have been submitted by this Board to the Board of Corrections and Charities and the State Board of Health, in accordance with the requirements of Act No. 206, Session Laws 1881; therefore

Resolved, That the plans and specifications for heating, plumbing, and sewerage thus submitted be officially adopted by this Board.

LIST OF PROPOSALS.

PROPOSALS FOR BRICK.

Based on definite plans and specifications.

Farr, Avery & Co., Grand Rapids and Detroit:	Per 1,000.
Stock brick.....	\$10 00
Machine brick	6 00
J. W. Markham, Traverse City:	
Stock brick.....	No bid.
Machine brick	\$6 25
Arthur E. Keifer & Co.:	
Stock brick.....	20 20
Machine brick	5 95
Waterman, Hovey & Curry:	
Stock brick.....	10 00
Machine brick	6 25
Brown, Clark & Co., Grand Rapids:	
Stock brick.....	No bid
Machine brick	\$9 00

Awarded June 23, 1882, to Farr, Avery & Co., at the price named, for 400,000 stock brick and 9,000,000 machine brick.

PROPOSALS FOR STONE.

Based on definite plans and specifications.

Wing, Morgan & Harford, Muskegon, Michigan:	Per cord.
No. 1 footing stone.....	\$16 00
Rubble stone.....	12 00
Farr, Avery & Co., Grand Rapids and Detroit:	
No. 1 footing stone.....	24 00
Rubble stone.....	13 00
The Worthington & Lake Huron Stone Co., Cleveland:	
No. 1 footing stone.....	33 00
Rubble stone.....	11 50

Awarded June 24, 1882, to Wing, Morgan & Harford, at the prices named, for 125 cords of No. 1 stone and 234 cords of rubble stone.

PROPOSALS FOR CONSTRUCTION OF ASYLUM.

Based on definite plans and specifications.

Gearing and Co., Detroit, Michigan.....	\$265,380 00
Bentleys & Nowlan, Milwaukee, Wisconsin.....	272,169 67
I. K. Cramer & Co., Toledo, Ohio.....	276,183 00
Farr, Avery, & Co., Detroit, and Grand Rapids, Michigan....	312,296 00
Collins & Jaynes, Detroit, Michigan.....	332,743 00
Hugh Richard & Lewis A. Danby, Jackson, Michigan	338,910 72
J. A. Moross & Co., Detroit, Michigan.....	357,409 00

Awarded, October 26, 1882, to Bentleys & Nowlan, in the sum of their proposition, \$272,169.67.

PROPOSALS FOR LOCKS, KNOBS, AND HINGES.

Based on definite plans and specifications.

These proposals were published in detail in the previous report. The aggregates were as follows:

J. B. Schroder & Co., Cincinnati, Ohio.....	\$2,120 08
Mallory, Wheeler, & Co., New Haven, Connecticut:	
Bid No. 1.....	2,107 36
Bid No. 2.....	2,119 51
Standart Brothers, Detroit, Michigan:	
Bid No. 1.....	2,751 01
Bid No. 2.....	3,789 63
Clark Manufacturing Company, Buffalo, New York.....	3,275 89
J. B. Shannon & Sons, Philadelphia, Pennsylvania.....	3,574 14

Awarded, October 25, 1884, to J. B. Schroder & Co.

PROPOSALS FOR BOXING, SHELVING, CLOTHES HOOK, STRIPS, ETC.

Bases on definite lists and specifications.

A. W. Wait, Traverse City.....	\$807 17
J. E. Greilick, Traverse City.....	506 20

Awarded to J. E. Greilick.

PROPOSALS FOR FURNISHING SEWER PIPE.

Jackson Fire-clay Sewer Pipe & Tile Company	-----65%	off from list.
Akron Sewer Pipe Agency	-----67%	off from list.

Awarded, December 1, 1884, to Akron Sewer Pipe Agency.

PROPOSALS FOR HEATING AND POWER BOILERS.

Based on definite plans and specifications, but not limited thereto.

Johnston Bros. & Co., Muskegon, Mich.:		
2 heating boilers, 26 ft. 4 in., 8 feet diameter	---\$9,950 00	
2 power boilers, 16 ft., 6 feet diameter	-----1,950 00	\$11,900 00
or, the four boilers complete for	-----	11,800 00
Adolph Leitelt, Grand Rapids, Mich.:		
2 heating boilers }		
2 power boilers }	for-----	10,600 00
Lake Erie Boiler Works, Buffalo, N. Y.:		
2 heating boilers	-----	\$7,800 00
2 power boilers	-----	2,500 00 10,300 00
Riter & Conley, Pittsburgh, Pa.:		
2 heating boilers }		
2 power boilers }	for-----	10,100 00
Buhl Iron Works, Detroit, Mich.:		
2 heating boilers	-----	\$7,826 00
2 power boilers	-----	2,200 00 10,026 00
Phoenix Foundry and Machine Company, Syracuse, N. Y.:		
2 heating boilers	-----	\$7,800 00
2 power boilers	-----	2,100 00 9,900 00
Robinson Boiler Works, Boston, Mass.:		
2 heating boilers }		
2 power boilers }	for-----	9,538 00
Stephen Pratt, Detroit, Mich.:		
2 heating boilers	-----	\$7,114 00
2 power boilers	-----	2,000 00 9,114 00
Glennon & Bee, Chicago, Ill.:		
2 heating boilers	-----	\$6,400 00
2 power boilers	-----	2,300 00 8,700 00
Woodward Steam Pump Company, New York:		
2 heating boilers }		
2 power boilers }	for-----	8,531 00
G. S. Wormer & Sons, Detroit, Mich.:		
2 heating boilers	-----	\$6,100 00
2 power boilers	-----	2,295 00 8,395 00
Phoenix Iron Works, Port Huron, Mich.:		
2 heating boilers }		
2 power boilers }	for-----	8,200 00
Cleveland Steam Boiler Works, Cleveland, O.:		
2 heating boilers	-----	\$5,725 00
2 power boilers	-----	2,145 00 7,870 00

John McGregor & Sons, Detroit, Mich.:			
2 heating boilers	}	for	\$7,571 00
2 power boilers			
Samuel I. Pope & Co., Chicago, Ill.:			
2 heating boilers	}	for	7,390 00
2 power boilers			
T. McGregor, Detroit, Mich.:			
2 heating boilers		\$5,243 00	
2 power boilers		2,000 00	7,243 00
Cincinnati Steam Heating Company, Cincinnati, O.:			
2 heating boilers		\$5,368 00	
2 power boilers		1,754 00	7,122 00
Lansing Iron and Engine Works, Lansing, Mich.:			
2 heating boilers		\$4,855 00	
2 power boilers		1,995 00	6,850 00
South Bend Boiler Works, South Bend, Ind.:			
2 heating boilers		\$4,600 00	
2 power boilers		2,100 00	6,700 00
The Tanner & DeLaney Engine Company, Richmond, Va.:			
2 heating boilers		\$4,250 00	
2 power boilers		2,050 00	6,300 00
Andrew Jack, Manistee, Mich.:			
2 heating boilers		No bid	
2 power boilers		\$3,200 00	3,200 00
Central Falls Boiler Works, Central Falls, R. I.— <i>Bid No. 1</i> :			
2 heating boilers		No bid	
2 power boilers		\$2,400 00	2,400 00
Central Falls Boiler Works, Central Falls, R. I.— <i>Bid No. 2</i> :			
2 heating boilers		No bid	
2 power boilers		\$3,000 00	3,000 00
Geo. Cadogan Morgan, Chicago, Ill.:			
On Firmenich's Safety Steam Boiler—			
2 boilers 516 horse-power— <i>Bid No. 1</i>			10,500 00
<i>Bid No. 2</i>			9,600 00
<i>Bid No. 3</i>			9,500 00
The Babcock & Wilcox Company, New York:			
On water-tube boilers—			
2 heating boilers		\$4,684 00	
2 power boilers		4,800 00	9,484 00
Pioneer Iron Works, Brooklyn, N. Y.:			
On Zell's Safety Water-Tube Boilers—			
2 heating boilers		4,250 00	
2 power boilers		3,600 00	7,850 00

Awarded January 22, 1885, to the Lansing Iron and Engine Works in the sum of the proposal.

PROPOSALS FOR PLUMBING AND FIRE PROTECTION.

Based on definite plans and specifications.

Samuel I. Pope & Co., Chicago, Ill.	\$19,379 00
Rundle, Spence & Co., Milwaukee, Wis.	17,829 84
W. J. Bowerman, Detroit	46,775 00
Webster & Meathe, Detroit	21,673 00
Shriver, Weatherly & Co.	17,938 75
John B. Dyar, Detroit	18,128 97

Awarded June 4, 1885, to Rundle, Spence & Co., in the sum of the proposal.

PROPOSALS FOR HEATING.

Based on definite plans and specifications.

Samuel I. Pope & Co., Chicago, Ill.	\$19,379 00
Rundle, Spence & Co., Milwaukee, Wis.	21,937 49
A. Harvey & Son, Detroit, Mich.	29,894 18
Cincinnati Steam Heating Co., Cincinnati, O.	27,498 00
John B. Dyar, Detroit, Mich.	23,460 05

Awarded June 4, 1885, to Samuel I. Pope & Co., in the sum of the proposal.

PROPOSALS FOR ELECTRIC LIGHT PLANT.

Based on definite plans and partial specifications.

The Bain Electric Company, New York:

2 300 light 16 candle power dynamos	\$6,000 00
1 35 light 16 " " " special	700 00
635 incandescent lamps, switches, fixtures and mouldings....	1,800 00
Line wire and putting up same, etc	1,500 00
1 60-horse power engine on foundations, automatic high speed (first-class)	1,500 00
1 40-horse power engine, automatic, high speed (first-class) ..	1,250 00
1 20-horse power engine, automatic, high speed (first-class) ..	1,000 00

Total	\$13,750 00
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The above prices include belting up and the lights in operation.

Van De Poele Construction Co.:

Dynamos with capacity for 700 lights	\$4,000 00
650 lamps, sockets, cut outs, etc.	1,300 00
200 automatic cut out switches with fusing plugs, etc.	50 00
Various kinds of wire, 15,000 feet	210 00
Labor of wiring, setting engines, etc.	1,000 00
2 " Ide " or " Ball " engines, capacity of 150-horse power ...	2,200 00
Setting engines, foundations, steam fitting, etc.	225 00

Total	\$8,985 00
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The above does not include cost of fixtures and moulding for covering the wires.

Brush Electric Co. Bid No. 1:

1 machine having a capacity of 450 lamps, of 16 to 20 candle power each.	
1 machine having a capacity of 300 incandescent lamps of 16 to 20 candle power each.	
All necessary wiring, cut outs, and switches, shades, etc., and everything erected and in place according to specifications for	\$12,400 00
The above includes \$1,500 for fixtures.	
1 automatic cut off Ball engine 8x10, developing 30 to 40-horse power, and	
1 similar Ball engine 9x12 developing 40 to 50-horse power for	3,575 00
Total for plant.....	<u>\$15,975 00</u>

Bid No. 2:

1 machine with a capacity of 450 lights of 16 to 20 candle power each.	
700 lamps, 16 to 20 candle power each, all erected in place, including everything according to specifications for	\$10,900 00
1 Ball engine 9x10, having an economical capacity of from 40 to 50-horse power, all complete and erected in place, connected up ready to give motion to the machinery and run the lights for	2,800 00
Total for plant.....	<u>\$13,700 00</u>

The United States Electric Lighting Company:

3 Weston dynamos, to operate 250 16-candle power lamps each.	
650 16-candle power Western incandescent lamps, complete and ready for lighting.	
Wiring, mouldings, etc., all complete.	
2 Porter-Allen Automatic cut-off engines of high rotative speed, erected on good substantial foundations, each of sufficient capacity to operate 500 16-candle power Weston incandescent lamps.....	\$11,900 00

The same as above excepting the arrangement of power and change in size of dynamos, viz:

Substituting, for the Porter-Allen engines, engines made by the same firm, and known as the "Southwark Engines," of sufficient capacity to operate properly and economically the same number of lights as mentioned, for the sum of.....	10,390 00
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Or: One "Southwark" 60 horse power, one "Southwark" 40 horse power, one "Southwark" 25 horse power, two 250 light dynamos, one 150 light dynamo, wiring, and appliances complete as specified.....	11,075 00
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Or: One Porter-Allen 60 horse power, one Porter-Allen 40 horse power, one Porter-Allen 25 horse power, two 250 light dynamos, and one 150 light dynamo, wiring, and apparatus complete, as specified.....	12,800 00
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The same in every respect excepting the substitution of 2 “ West-
inghouse ” engines, size 11x10, for the sum of.....\$10,600 00

Or: One 60 horse power “ Westinghouse,” one 40 horse power
“ Westinghouse,” one 25 horse power “ Westinghouse,” two
250 light dynamos, one 150 light dynamo, wiring, and appli-
ances complete, as specified..... 10,932 00

Edison Company for isolated lighting:

2 Edison dynamos, type No. 10, aggregate capacity 500 lamps
of 16-candle power each, or their equivalent in candle power.
1 Edison dynamo, No. 4, capacity 100 lamps of 16-candle power
each.

700 Edison lamps, 16-candle power each.

100 “ “ “ “ “

12 Extra commutator brushes.

629 Sockets for lamps.

3 Regulators.

3 Dynamo base frames.

3 Pressure indicators.

3 Ampere indicators.

Wiring, moulding, etc., all complete for..... \$8,659 70

2 Armington & Sims’ engines complete, with acces-
sories, size 9½x10..... \$1,620 00
1 8x9 Armington & Sims’ engine complete..... 652 50
2 foundation boxes..... 80 00
1 “ “ 30 00
18 foundation bolts for brickwork..... 42 00
18 bolts and nuts for engine beds..... 13 40
3 engine foundations for above..... 275 00
3 selected, leather, endless belts..... 60 00
2,772 90

Total..... \$11,432 60

Awarded, June 25, 1885, to the Edison Company for isolated lighting, on
the basis of the proposal.

PROPOSALS FOR OUTFITTING KITCHENS.

The principal items of these proposals were as follows:

Bramhall, Deane & Co., New York:

Range, 20 feet—5 fires, 5 ovens..... \$233 34
Double shelf for same..... 40 00
Canopy over range..... 50 00
4 steam roasting ovens..... 340 00
5 33-gallon vegetable kettles..... 186 67
2 70-gallon iron steamers..... 133 34
Set of mammoth urns for tea and coffee..... 525 00
1 5-foot range—1 fire, 2 ovens, double plate shelf..... 93 00
1 24-inch broiler..... 42 00
Hood over range and broiler..... 20 00
Hot water urn, 3 gallons..... 30 00

Delivered at Traverse City.

John Van Range Co., Cincinnati, O.:

1 15-foot, 3-oven range.....	\$607 50
2 30-foot broilers, joined.....	120 00
Canopy over range and broilers.....	60 00
1 large steam table, 10 feet by 2 feet 8 inches, with 7 sinks and steamers for vegetables, and canopy overhead.....	66 00
2 75-gallon copper steamers.....	256 00
Tea and coffee apparatus, copper.....	573 00
1 60-gallon cast iron steam kettle.....	33 00
1 coffee roaster, to hold 45 pounds.....	33 00
1 40-gallon copper jacket kettle.....	95 00
1 5-fire, two-oven range.....	154 20
1 18-inch broiler.....	30 00
Canopy over range and broiler.....	30 00

Five per cent. off above prices delivered and put in place.

Duparquet & Huot, New York:

1 10-foot range—2 fires, 3 ovens.....	\$108 00
Double shelf for same.....	15 00
1 30-inch charcoal broiler.....	38 00
6 cast iron, steam roasting ovens, 24½ x 18 x 9.....	450 00
1 cast iron 30-inch steam broiler.....	55 00
3 cast iron steamers, 70 gallons each.....	180 00
1 40-gallon steamer.....	45 00
6 33-gallon cast iron vegetable steamers.....	165 00
Tea and coffee apparatus.....	315 00
1 5-foot range, 2 ovens.....	62 00
Sheet iron double shelf for same.....	9 00
24-inch charcoal broiler and base.....	33 00
Set of urns for tea and coffee.....	96 00
1 copper hot water carving table, 6 feet, 6 in.....	58 00
1 galvanized iron plate warmer, 36 x 20 x 5 feet high.....	38 00

All of the above delivered in New York city for \$1,667.

Francis Morandi & Son, Boston, Mass.:

1 8-foot French range.....	\$150 00
1 roasting oven, 7 foot by 4 foot by 20 inches.....	275 00
4 2-bushel steamers.....	100 00
1 50-gallon jacket kettle.....	65 00
1 60-gallon jacket kettle.....	75 00
1 25-gallon one-half jacket kettle.....	35 00
1 30-gallon tea apparatus.....	75 00
1 50-gallon coffee apparatus.....	100 00
1 10-foot steam table.....	90 00
1 4-foot range.....	80 00
1 5-gallon tea and coffee apparatus.....	100 00
1 5-foot steam table.....	45 00

Delivered in Boston.

Awarded July 29, 1885, to the John Van Range Company, on the basis of their bid, which included hammered copper ware, tin ware, and a complete outfit of large and small kitchen implements and utensils, the whole order amounting to \$2,369.50.

PROPOSALS FOR OUTFITTING LAUNDRY.

The proposals were for a complete laundry outfit, including plumbing, shafting, belting, etc., to wash for a population of 650.

The bids were very diverse and extended, and it is unnecessary to reproduce them in full. The bidders were:

The A. M. Dolph Co., Cincinnati, O.	\$3,450 00
Or, substituting wood washers for brass washers	2,800 00
The Troy Laundry Machine Co.	2,882 64
G. W. Gordon, Chicago	3,000 00
Empire Laundry Machine Co., Chicago	2,500 00
Oakley & Keating, New York (partial outfit)	1,469 00
N. A. Briggs, Shaker Village, N. H., for wash tubs only, 8 tubs	375 00
American Laundry Machine Co., New York (partial outfit)	1,157 50

No award made and second proposals called for.

Second proposals for laundry outfit, based upon definite list of goods:

The A. M. Dolph Co., Cincinnati, O.:	
4 No. 5 Dolph washing machines	\$900 00
1 64-inch steam mangle	475 00
1 30-inch Dolph centrifugal extractor	315 00
1 combined shirt, collar and cuff ironer	195 00
1 dry room—30 bars, 1,250 feet of pipe	400 00
1 5-gallon steam jacketed starch kettle	25 00
6 wooden wash tubs	35 00
50-feet ironing tables	50 00
1 No. 3 sad iron heater and room for same	80 00
4 square pine truck tubs	50 00
1 blower	15 00
24 sad irons and 6 polishing irons	12 00
1 power rubber-roll wringer	35 00
1 collar and cuff shaping machine	25 00
1 collar dampening machine	15 00
1 generator for heating combined ironer	15 00
1 soap kettle	25 00
1 boiling tub	15 00
Shafting, pulleys, belting, etc.	525 00
3 iron soap tanks, 180 gallons each	60 00

All the foregoing for \$2,900.00.

George W. Gordon, Chicago:

This bid was the same as that of A. M. Dolph, except 4 No.

5 Dolph washing machines	\$1,000 00
1 combined shirt, collar and cuff ironer	190 00
1 dry room, 25 bars	425 00
1 gas machine	125 00
1 generator for heating combined iron (omitted)	15 00
Shafting, pulleys, etc.	504 00
3 iron soap tanks, 192 gallons each	120 00

This bid, on the same basis as the former bid, amounts to \$2,990.

Troy Laundry Machine Company, Troy, N. Y.:

2 No. 3 and 2 No. 2 Wood washers	\$610 00
1 64-inch steam mangle	390 00
2 26-inch centrifugal wringers (Cairns')	375 00
1 combined shirt, collar and cuff ironer	150 00
1 dry-room—25 bars and 1,175 feet of pipe	450 00
1 5-gallon, steam-jacketed starch-kettle	25 00
6 wooden wash-tubs	35 00
50-foot ironing table	37 50
1 No. 3 heater and room	45 00
4 pine truck-tubs	30 00
1 blower	15 00
24 sad irons	9 30
6 polishing irons	3 00
1 power rubber-roll wringer	30 00
1 collar and cuff shaping machine	30 00
1 collar dampening machine	25 00
1 generator for heating combined ironer	20 00
1 soap kettle	32 00
1 boiling tub, copper lined	50 00
Shafting, pulleys, belting, etc.	694 85
2 wooden soap tanks, 375 gallons each	60 00

All the foregoing for \$3,175.

Awarded July 29, 1885, to the A. M. Dolph Company at \$2,900.

PROPOSALS FOR WOVEN-WIRE MATTRESSES.

Based on samples and prices submitted.

Ames & Frost, Chicago, Ill.:

	Single.	Double.
Hartford weave, malleable iron—		
Socket extension, 19 $\frac{3}{4}$ wire	\$2 10	\$2 25
Same, but contains less wire	1 90	2 00
“ “ “ “ “	1 70	1 80
“ “ “ “ “ 20 wire	1 70	1 80

M. J. Murphy & Co., Detroit, Mich.	1 65	1 85
Peninsular Spring Bed Company, Detroit, Mich.	1 90	1 90
Grand Rapids Mattress Company, Grand Rapids, Mich.	1 38 $\frac{1}{2}$	1 83
John Wanamaker, Philadelphia, Pa.	3 05	3 30

Union Wire Mattress Company, Chicago, Ill.:		
Eclipse coarse weave	1 92	2 11
Favorite medium weave	2 13	2 38
Best fine weave	2 44	2 76

Awarded July 29, 1885, to Ames & Frost for best beds—500 at \$2.10 and 60 at \$2.25.

PROPOSALS FOR DUMB WAITERS AND ELEVATORS.

A. S. King, Pontiac:

6 Dumb waiters for wards.	
1 Dumb waiter for Administration building.	
1 Trunk elevator for Administration building.	
1 Elevator for laundry.	
All the above for	\$825 00

The Middlebrook & Son Manufacturing Company:		
6 Dumb waiters for wards at \$150.....	\$900 00	
1 Dumb waiter for Administration building.....	100 00	
1 Trunk elevator.....	175 00	
1 Elevator for laundry.....	160 00	
		\$1,335 00
Awarded, July 29th, 1885, to A. S. King.		

PROPOSALS FOR HAIR MATTRESSES AND PILLOWS, MADE UP IN A. C. A.
TICKING.

Based on specifications and samples of hair.

John Wanamaker, Philadelphia, Pennsylvania:		Per lb.
Pure soft hair.....		\$0 38
No. 1 feathers.....		56
Nelson, Matter, & Co., Grand Rapids, Michigan:		
Hair, as per sample submitted.....		38
Phoenix Furniture Company, Grand Rapids:		
No. 1 Pure black South American horse hair, all manes and tails.....	40 & 40½c	
No. 1½ Pure South American, mixed with fetlock and forelock,	\$0 36¾	
Nos. 1 and 1½ mixed.....	38	
Prime geese feathers.....	59	
Taylor, Woolfenden, & Company, Detroit, Michigan:		
Steam dressed feathers, as per sample.....	55	
Pure South American soft hair, as per sample submitted, No. 1,	39	
“ “ “ “ “ No. 2,	37½	
“ “ “ “ “ No. 3,	37	
Benjamin Fitch & Company, New York:		
Pure South American hair, either black or grey.....	36	
Prime geese feathers, steam renovated.....	58	
“ “ second grade.....	50	
E. M. Hulse & Co., Chicago, Ill.:		
Pure soft South American horse hair, either black or grey....	\$0 45	
A. A. hair.....	41	
Hair pillows 2c. per lb. less.....		
Select A. A. feathers.....	60	
Grand Rapids Mattress Co., Grand Rapids, Mich.:		
Pure black South American horse hair.....	35½	
Best live geese feathers.....	55	
Marshall Field & Co., Chicago, Ill.:		
Pure black or grey.....	44½	
No. 1 xx.....	44½	
No. 1 x grey.....	43½	
No. 1 grey or black.....	38	
No. 1½ grey or black.....	35½	
No. 1¾ black.....	32½	
Pure soft.....	40½	
No. 2 French drawings.....	39	
G. H. Grey.....	32½	

Hair pillows:

No. 1 $\frac{7}{8}$, sample 3lb each	\$1 15
No. 1 $\frac{1}{2}$, sample 3lb each	1 20
No. 1, sample 3lb each	1 25
No. 1x grey, sample 3lb each.....	1 40
No. 1xx, sample 3lb each.....	1 50
Pure, sample 3lb each.....	1 50
Prime feathers (sample).....	57 $\frac{1}{2}$

Feather pillows awarded July 30, 1885, to Marshall Field & Co., at 57 $\frac{1}{2}$ c per lb. made up.

Mattresses and hair pillows awarded September 2, 1885, to Nelson, Matter & Co., at 38c per lb. made up and delivered.

PROPOSALS FOR OVENS.

Thomas Hunter, Toronto, Canada, proposes to build oven 10 feet by 12 feet, inside complete with all his improvements, for \$500.

A. J. Fish & Co., Chicago, Ill., 1 12-foot rotary oven, all complete with latest improvements, \$775. New motive power \$85 extra. Also makes proposal for complete bakery outfit in the sum of \$145.

No award made.

Two old fashioned brick ovens built by hired labor at a total cost of \$488.46.

PROPOSALS FOR DEEP WELL PUMP.

Based on specifications in part.

Knowles Steam Pump Works, New York:

Pump having 14-inch diameter, steam cylinder, 8-inch diameter, water cylinder, and 18-inch stroke, with 10 feet of connections between the two cylinders; 15 per cent. off from.....\$925 00

The Dean Steam Pump Company, Holyoke, Mass.:

Pump having 14-inch cylinder and 16-inch stroke, without connections..... 490 00

Fairbanks, Morse & Co., Chicago, Ill.:

Pump (Smith-Vaile), 13 $\frac{1}{2}$ -inch cylinder, 8-inch diameter, water cylinder, and 18-inch stroke; also necessary connecting rod and connecting pipes for 34 feet in depth from well-curb to water cylinder platform, iron guides for same, steam cylinder and working parts on top of well nicely finished and polished, steam cylinder lagged with black walnut and brass banded, cylinder head polished..... 630 00

Awarded August 27, 1885, to Fairbanks, Morse & Co.

PROPOSALS FOR CROCKERY.

Based on definite lists furnished to each bidder, including glassware, 2 sets china ware and 12 toilet sets complete.

Van Heusen, Charles & Co., Albany, N. Y.:

Boote's ware—delivered..... \$905 36

Homer Laughlin, East Liverpool, O.:	
Domestic ware—not delivered	\$691 46
W. H. Glenny, Sons & Co., Buffalo, N. Y.:	
Meakin's ware—delivered	1,017 05
Jones, McDuffee & Stratton, Boston, Mass.:	
Meakin's ware—delivered	723 78
Boote's ware—delivered	841 29
Awarded September 2, 1885, to Jones, McDuffee & Stratton on Meakin's ware.	

PROPOSALS FOR FURNITURE—FIRST COMPETITION.

Based on definite lists and specifications.

Nelson, Matter & Company, Grand Rapids, Michigan:	Rubbed Oil finish.
Single bedsteads	\$3 90
Double bedsteads	3 90
Bureaus	5 25
Wardrobes	9 00
Stands	1 95
Dining table	4 65
Side tables	4 65
Settees	4 75
The Robert Mitchell Furniture Company, Cincinnati, Ohio:	
Single bedsteads	\$4 61
Double bedsteads	5 57
Bureaus	5 13
Wardrobes	12 29
Stands	2 34
Dining tables	5 29
Side tables	4 51
Settees	No bid.
Buchanan Manufacturing Company, Buchanan, Michigan:	
Single bedsteads	\$4 00
Double bedsteads	4 00
Bureaus	5 75
Wardrobes	8 75
Stands	1 50
Dining tables	No bid.
Side tables	No bid.
Settees	No bid.
Phoenix Furniture Company, Grand Rapids, Michigan:	
Single bedsteads	\$4 55
Double bedsteads	5 10
Bureaus	5 00
Wardrobes	8 75
Stands	3 10
Dining tables	7 32
Side tables	4 50
Settees	3 75

John Wanamaker, Philadelphia, Pennsylvania:

Single bedsteads.....	\$2 90
Double bedsteads.....	3 05
Bureaus.....	5 75
Wardrobes.....	5 70
Stands.....	1 52
Dining tables.....	5 50
Side tables.....	3 30
Settees.....	No bid.

Grand Rapids Chair Company, Grand Rapids, Michigan:

	Varnish finish.	
Single bedsteads.....	\$3 35	\$3 60
Double bedsteads.....	3 60	3 85
Bureaus.....	4 42	4 62
Wardrobes.....	7 50	7 83
Stands.....	1 80	1 95
Dining tables.....	4 65	4 65
Side tables.....	4 35	4 35
Settees.....	3 00	3 20

Widdicomb Furniture Co., Grand Rapids, Mich.:

	Varnish finish.	Oil Rubbed finish.
Single bedsteads.....	\$4 00	\$4 25
Double bedsteads.....	4 50	4 75
Bureaus.....	6 25	6 50
Wardrobes.....	No bid	No bid.
Stands.....	1 50	1 60
Dining tables.....	6 25	6 75
Side tables.....	4 50	4 75
Settees.....	No bid	No bid.

No award made.

Second Competition.

Based on revised specifications.

Grand Rapids Chair Co., Grand Rapids, Mich.:

Single bedsteads.....	\$3 85
Double bedsteads.....	4 10
Bureaus.....	5 07
Wardrobes.....	8 13
Stands.....	1 95
Dining tables.....	4 65
Side tables.....	4 35
Bedsteads as per drawing submitted.....	4 85

Nelson, Matter & Co., Grand Rapids, Mich.:

Single bedsteads.....	\$3 90
Double bedsteads.....	3 90
Bureaus.....	5 50
Wardrobes.....	9 00
Stands.....	1 95
Dining tables.....	4 65
Side tables.....	4 65
Bedsteads as per drawing submitted.....	4 75

Widdicomb Furniture Co., Grand Rapids, Mich.:	Oil Rubbed finish.
Single bedsteads	\$3 75
Double bedsteads.....	4 25
Bureaus.....	6 00
Wardrobes	9 00
Stands	1 60
Dining tables.....	5 75
Side tables	3 25
Bedsteads as per sample	4 50

Awarded to Widdicomb Furniture Co. September 2, 1885, for five hundred single bedsteads, sixty double bedsteads, one hundred and eighty-five bureaus, eighty-five wardrobes, two hundred stands, seventy-two dining tables, and twenty-one side tables.

PROPOSALS FOR SILVER-PLATED FLAT WARE.

For 56 dozen table spoons; 3 dozen dessert spoons; 58 dozen tea spoons; 53 dozen medium knives; 3 dozen dessert knives; 53 dozen medium forks; 3 dozen dessert forks; all double plate.

Black Hardware Co., Detroit:	
Reed & Barton's goods, delivered.....	\$902 91
Landers, Frary & Clark, New Britain, Conn.:	
Goods of the William Rogers Manufacturing Co., under the trade mark, "Wm. Rogers & Sons," delivered.....	769 25
Goods of Landers, Frary & Clark, delivered.....	732 15
Van Heusen, Charles & Co., Albany, N. Y.:	
Goods of Holmes, Booth & Hayden	712 71
Goods of Rogers Bros., 1847.....	840 91
Goods of Reed & Barton, delivered.....	852 35
C. H. Rollins, Chicago, Ill.:	
Goods of Meriden Britannia Co., stamped "Rogers Bros., 1847," delivered.....	861 31
Roehm & Wright, Detroit:	
Goods of Rogers & Bros.....	901 75
H. E. Allison, Pontiac:	
Goods of Rogers, Smith & Co., Rogers Bros., 1847, or Meri- den Britannia Co., delivered.....	871 00
The Holmes & Edwards Silver Co., Chicago:	
Goods, triple plate, of Holmes & Edwards, delivered.....	837 10
Jones, McDuffee & Stratton, Boston:	
Goods of Reed & Barton, Rogers Bros., or Holmes, Booth & Hayden, delivered.....	854 12
Five per cent. for delivery.	
Awarded September 2, 1885, to C. H. Rollins, Chicago.	

PROPOSALS FOR SILVER PLATED HOLLOWWARE.

For 5 $\frac{1}{4}$ dozen plated casters; $\frac{1}{3}$ dozen plated casters; 1-6 dozen pickle casters; 1-6 dozen sugars; 1-6 dozen creamers; 1-6 dozen syrups; all quadruple plate.

Black Hardware Co., Detroit:

Goods of Reed & Barton, delivered----- \$282 25

Landers, Frary & Clark:

Goods of Wm. Rogers & Son, delivered, 50 per cent. and 10 per cent. off list.

Van Heusen, Charles & Co., Albany, N. Y.:

Goods of Reed & Barton, delivered, 59 per cent. off list.

C. H. Rollins, Chicago, Ill.:

Goods of Meriden Britannia Co., delivered, 40 and 10 off list, and 6 per cent., 10 days.

Roehm & Wright, Detroit:

Goods not named, 50 per cent. off list.

H. E. Allison, Pontiac:

Goods of Rogers, Smith & Co., or Meriden Britannia Co., delivered ----- 185 66

The Holmes & Edwards Silver Co.:

Goods of Holmes & Edwards, delivered, 5, 10 and 6 off.

Jones, McDuffee & Stratton, Boston, Mass.:

Goods of Reed & Barton----- 230 90

Five per cent for delivery.

Awarded Sept. 2, 1885, to Van Heusen, Charles & Co., for goods of Reed & Barton.

PROPOSALS FOR CUTLERY.

On 21 set carvers; 21 bread knives; 6 dozen rubber-handled knives; 6 dozen rubber-handled forks; 4 dozen vegetable knives.

Proposals and samples of goods, varying greatly in quality and price, were submitted by:

Black Hardware Company, Detroit.

Van Heusen, Charles & Co., Albany.

A. L. Lacombe, Manager Meriden Britannia Company, Meriden, Conn.

Roehm & Wright, Detroit.

Holmes & Edwards, Chicago.

Jones, McDuffee & Stratton, Boston.

Landers, Frary & Clark, New Britain, Conn.

Awarded September 27, 1885, to Landers, Frary & Clark, an order amounting to \$66.54.

PROPOSALS FOR SHEETS AND PILLOW SLIPS.

Based on Definite Specifications.

Material.	Hamilton & Milliken, Traverse City.	J. K. Burnham & Co., Detroit.	John Wanamaker, Phil- adelphia.	John V. Farwell & Co. Chicago.	Taylor Woolfenden & Co., Detroit.	Marshall Field & Co., Chicago.	Newcomb, Endicott & Co., Detroit.
1,500 Utica 58-lb. brown sheets.....	44	41½	* 41¼	-----	† 48½	45	40
500 8-4 bleached sheets.....	62	62	56 3-10	-----	59	62⅔	55
225 9-4 bleached sheets	68	72½	61 3-10	-----	64½	69	60
100 10-4 bleached sheets.....	64	78	66 3-10	-----	70	74	65
1,750 Utica 5-4 bleached pillow slips.....	16¼	18½	16 1-10	-----	18	18	15
100 Utica 6-4 bleached pillow slips.....	{ 17	24	19	-----	20½	5-4 18	17½

* ¼ and ¾ hems.
† Waste extra, F. O. B., Chicago.

Awarded September 2, 1885, to Newcomb, Endicott & Co., Detroit.

PROPOSALS FOR COUNTERPANES.

Based on samples and prices submitted therewith.

- Marshall Field & Co., Chicago.
- Newcomb, Endicott & Co., Detroit.
- J. K. Burnham & Co., Detroit.
- H. B. Claflin & Co., New York.
- John Wanamaker, Philadelphia.
- Taylor, Woolfenden & Co., Detroit.
- Edson, Moore & Co., Detroit.

Awarded September 2, 1885, to Marshall Field & Co. for Bates' 1¼ quilts, 700 at 85 cents, less 2 per cent., 10 days; also 40 1¼ Marseilles quilts at \$2.60, less 2 per cent., 10 days. Also awarded September 2, 1885, to Newcomb, Endicott & Co. for 70 quilts, Monument Mills, Marseilles pattern, at \$1.02½.

PROPOSALS FOR COMFORTABLES.

Based on samples and prices submitted therewith.

- J. K. Burnham & Co., Detroit.
- Marshall Field & Co., Chicago.
- H. B. Claflin & Co., New York.
- Newcomb, Endicott & Co., Detroit.
- John Wanamaker, Philadelphia.
- Taylor, Woolfenden & Co., Detroit.

Awarded September 2, 1885, to Taylor, Woolfenden & Co. for 600 comfortable, 7 feet long and 6 feet wide, made from Cocheco cambric and a fine quality of batts, 5½ pounds each, at \$1.70.

PROPOSALS FOR NAPKINS.

Based on prices and samples submitted therewith.

Marshall Field & Co., Chicago.
J. K. Burnham & Co., Detroit.
Newcomb, Endicott & Co., Detroit.
Taylor, Woolfenden & Co., Detroit.

The order was divided between Newcomb, Endicott & Co., \$26.25; J. K. Burnham & Co., \$20.30, and Taylor, Woolfenden & Co., \$22.12.

PROPOSALS FOR TABLE LINEN AND TURKEY-RED DAMASK AND OIL-CLOTH.

Based on prices and samples submitted therewith.

Marshall Field & Co., Chicago.
Hamilton & Milliken, Traverse City.
J. K. Burnham & Co., Detroit.
Taylor, Woolfenden & Co., Detroit.
Newcomb, Endicott & Co., Detroit.

The order was divided between Hamilton & Milliken, \$68.90; Newcomb, Endicott & Co., \$135.33; J. K. Burnham & Co., \$242.17, and Taylor, Woolfenden & Co., \$34.65.

PROPOSALS FOR BLANKETS.

Based on samples and prices submitted therewith.

J. K. Burnham & Co., Detroit.
Marshall Field & Co., Chicago, Ill.
H. B. Claflin & Co., New York.
John Wanamaker, Philadelphia.
Taylor, Woolfenden & Co., Detroit.
Edson, Moore & Co., Detroit.
Hamilton & Milliken, Traverse City.

Awarded September 2, 1885, to Hamilton & Milliken for all wool blankets at 50c per lb.

RUBBER SHEETING.

Newcomb, Endicott & Co., Detroit.
Hamilton & Milliken, Traverse City.
Taylor, Woolfenden & Co., Detroit.
J. K. Burnham & Co., Detroit.

Order made with Taylor, Woolfenden & Co. amounting to \$114.88.

PROPOSALS FOR TOWELS, TOWELING AND CRASH.

Based on prices and samples submitted therewith.

Marshall Field & Co., Chicago.
J. K. Burnham & Co., Detroit.
Newcomb, Endicott & Co., Detroit.
Taylor, Woolfenden & Co., Detroit.

Awarded to Hamilton & Milliken an order for many kinds of towels and crash amounting to \$263.95

PROPOSALS FOR CHAPEL SEATING.

Based on samples or cuts submitted.

American Desk and Stool Co., Chicago.
A. H. Anderson & Co., Chicago.
Michigan School Furniture Co., Northville, Michigan.
J. S. Ford, Johnson & Co., Chicago.
Thomas Kean & Co., Chicago.
Robert Mitchell Furniture Co., Cincinnati, O.
Awarded September 24, 1885, to the Michigan School Furnitnre Co. for
318 folding seats at \$1.40 each.

PROPOSALS FOR CARPETS.

Hudson & Symington, Detroit:	
Lowell extra super	\$0 65
Park Mills	62½
Dobson	60
Lowell full five frame body Brussels	1 17½
Bromley “ “ “	1 00
Whitall “ “ “	1 00
Lowell ⅝ border	05½
Bromley or Whitall border	1 90
Linoleum “ A ” quality figured	80
“ “ “ plain	75
Making ingrain carpet	05
Making body Brussels with border	05
“ “ without border	04
Bedside cotton chain, 2 yards each	1 15
Best stitched O. C. I. Co. lining (per bale)	9 00
John V. Farwell & Co., Chicago:	
Lowell extra super	\$0 62½
Hartford extra super	62½
Philadelphia extra super	55 to 62½
Washusetts body Brussels	85
Hartford body Brussels	1 05
Homer body Brussels	1 00
Linoleum “ A ” quality plain	50 to 75
Making carpets for all kinds	05
Stitched carpet lining (per bale)	\$6 50 to 8 50
Marshall Field & Company, Chicago, Illinois:	
Lowell extra super	\$0 67½
Park Mills extra super	62½
Full five frame body Brussels	1 15
Cotton chain bedsides, per yard	25
5 Row stitched carpet lining, per bale	6 50
Extra super cotton chain	50
All wool ingrain	52½ to 60c

Chicago Carpet Company, Chicago:

Lowell extra super.....	\$0 67½
Hartford extra super.....	65
Bigelow body Brussels.....	1 17½
Lowell body Brussels.....	1 15
Hartford body Brussels.....	1 07½
Making ingrain carpet.....	04
Making ingrain border carpet.....	07
Bedsides cotton chain, per yard.....	25
5 Row stitched carpet lining, per bale.....	7 50
Extra super cotton chain.....	52½

H. B. Claflin & Co., New York:

Bromley full 5 frame body Brussels, by the roll.....	97½
Homer " " " ".....	97½
Linoleum, "A" quality, plain.....	75
" "B" " ".....	62½
Best stitched carpet lining, per bale.....	7 50
Extra super cotton chain, by the roll.....	47½
H. B. Claflin extra super.....	60

All 4 per cent off, 10 days.

J. H. Black & Co., Detroit:

Best ingrains, per yard.....	75
Best body Brussels.....	1 40
Best tapestry.....	1 00
Best taped lining.....	08
Best cotton chain extra supers.....	60
Making.....	05

Hamilton & Milliken, Traverse City:

Lowell extra supers.....	65
Hartford extra supers.....	62½
Homer 5 frame body Brussels.....	1 00
Hartford " " " ".....	1 05
Linoleums, best English.....	75
" " second quality.....	62½
Sewed lining, per bale.....	\$7 50 & 8 50

All prices by the piece. This is but a portion of the qualities and makes submitted.

Newcomb, Endicott, & Co., Detroit:

Bigelow and Lowell body Brussels.....	\$1 12½
$\frac{5}{8}$ Border for same.....	1 07½
9 Inch border.....	40
Hartford, Bromley, or Homer's body Brussels.....	1 00
$\frac{5}{8}$ Border for same.....	95
Making Brussels carpet.....	05
Lowell & Dorman 3 ply all wool ingrain.....	85
" 2 " " extra super.....	65
Hartford and other standard extra supers, 2 ply all wool.....	62½
Making ingrain carpets, without border.....	03
" " with " ".....	05

Newcomb, Endicott, & Co., Detroit:

2-4 Venetian borders	\$0 40
⁵ / ₈ " "	45
No. 1 Linoleum	80
No. 5 "	70

Awarded, October 14, 1885, to Newcomb, Endicott, & Co., for all carpets cut and made up, and, October 17, 1885, to H. B. Claflin & Co., for all carpets by the piece; the order of the former amounting to \$1,329.38, and of the latter to \$733.62.

PROPOSALS FOR WAGONS, SLEIGHS AND CARRIAGES.

These proposals were very diverse and were received from:
The Hannah & Lay Mercantile Company, Traverse City, Mich.
Sievers & Erdman, Detroit, Mich.
V. & A. Petertyl, Traverse City, Mich.
Carrier & Lockwood, Traverse City, Mich.

The following selections were made:

Sievers & Erdman:

Jackson farm wagon	\$65 00
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V. & A. Petertyl:

1 pair bobs	24 00
1 large 4-seated sleigh for patients	100 00
1 large 3-seated carriage for patients	450 00

The Hannah & Lay Mercantile Co.:

1 buggy	122 00
1 cutter	25 25
1 express sleigh	30 00
1 express wagon	125 00
1 Jackson wagon	60 00
1 pair bobs	23 00

PROPOSALS FOR HARNESES.

Proposals for harnesses were received from:
Wilhelm, Bartak & Co., Traverse City, Michigan.
John T. Beadle, Traverse City.

The following order was placed with:

John T. Beadle, Traverse City, Michigan:

1 set team harness	\$25 00
2 set single harness	43 00
1 set double carriage harness	35 00
1 set team harness	28 00
1 express harness	13 50
1 cart harness	16 50

PROPOSALS FOR HOLLAND AND WINDOW FIXTURES.

Based on samples and prices submitted therewith:

Marshall Field & Co., Chicago, Ill.

H. B. Claflin & Co., New York.

Newcomb, Endicott & Co., Detroit.

Taylor. Woolfenden & Co., Detroit.

J. K. Burnham & Co., Detroit.

Awarded Oct. 30, 1885, to Marshall, Field & Co., for Providence 36-inch white American Holland, 500 yards, at $7\frac{1}{2}$ cents per yard, 2 per cent. off, 10 days; and 100 yards Scotch, 36 inches, at 17c., less 5 per cent. and 6 per cent. off for cash, 10 days.

PROPOSALS FOR PIPE COVERING.

Proposals were invited, based on definite specifications, for five different combinations of covering, but proposals for other methods were not excluded.

Method No. 1 was:

4 thicknesses 1-32-inch asbestos paper.

1 thickness 1-inch hair felt.

1 thickness manilla paper.

1 thickness 8-ounce duck.

Method No. 2:

2 thicknesses 1-32-inch asbestos paper, otherwise as in Method No. 1.

Method No. 3:

1 thickness 1-32-inch asbestos paper, otherwise as in No. 1.

Method No. 4:

1 thickness 1-inch hair felt.

1 thickness 8-ounce duck.

Method No. 5:

1 ring 1-2 x 3-16-inch asbestos every foot of pipe.

4 thicknesses straw-board.

1 thickness 1-inch hair felt.

1 thickness 8-ounce duck.

The various kinds to be applied to pipes for various uses, in accordance with their amount of exposure, etc.

The following proposals were received, which were not given in detail because of their great length. Samples were submitted with the proposals:

Samuel I. Pope & Co., Chicago, Ill.:

Based on specifications.

F. Worcester, Chicago, Ill.:

Based on specifications.

Manville Covering Company, Milwaukee, Wis.:

$1\frac{3}{4}$ inches in thickness of wool plastic covering, wrapping of muslin spirally wound.

$\frac{1}{4}$ -inch furnishing coat of wool plastic covering, prices ranging from 77 cents per foot of pipe for 12-inch pipe to 17 cents per foot for $\frac{3}{4}$ -inch pipe.

Marvin Van Court, Detroit, Mich.

PROPOSALS FOR LABOR AND MATERIALS SEPARATE, AND DIFFERING SOME-
WHAT FROM SPECIFICATIONS.

Shields & Brown, Chicago and New York :

Bradley's insulated hair covering, mainly of paper, 12-inch to 5-inch pipe, standard covering inclusive, 20 per cent. and 20 per cent. off list; smaller than 5-inch, half-thickness of standard, 50 per cent. off list; water-pipe covering, 40 per cent. off list.

G. E. Bessinger, Detroit:

Offers to do the labor at \$2.00 per day and expenses.

The Chalmers-Spence Company, New York :

For their own covering, prices ranging from 20 cents per foot for 1¼-inch pipe and smaller to 86 cents per foot for 12-inch pipe.

Laing Manufacturing Company, Pittsburg, Pa. :

Corrugated in space, sectional covering, as per sample, prices ranging from 12 cents per foot of pipe for 7⁄8-inch pipe to 56½ cents per foot of pipe for 12-inch pipe for the material, and 25 per cent. added for applying the material.

Will cover all pipes for \$2,774.65 and board of men.

Crosby, Burton & Co., Chicago:

As per specifications, prices ranging from 20 cents per foot for 1-inch pipe to \$1.10 per foot for 12-inch pipe.

Atley Manufacturing Company, Chicago:

Based on specifications, from 22½ cents per foot for 1½-inch pipe to 95 cents per foot for 12-inch pipe.

J. P. Donaldson & Co., Detroit:

Based on specifications.

SCHEDULE OF PRICES.

Size of Pipe.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
12 inches-----	59½	52½	49	48	72
10 "-----	50½	45	42	40	63
9 "-----	43	37½	35	33	55
8 "-----	40	35½	33	31	45
7 "-----	41	37	35	33	42
6 "-----	32½	28	26½	24½	36
5 "-----	25½	22½	21	19	33
4½ "-----	24	21½	20	18	30
4 "-----	22	19½	18½	16½	27
3½ "-----	18	16	15	15½	26
3 "-----	17	15	14	12½	24
2½ "-----	16½	15	14	12	22
2 "-----	13½	12½	12	10½	18
1½ "-----	13	12	11½	10	17
1¼ "-----	11½	10	9½	8	17
1 "-----	11½	11	10½	9	16
¾ "-----	11½	11	10½	9	15

Awarded Dec. 3, 1885, to J. P. Donaldson & Co., on basis of proposition.

PROPOSALS FOR FARM BARN, CARRIAGE BARN AND COAL SHED.

	Farm Barn.	Carriage Barn.	Coal Shed.
Charles H. Rose.....	\$1,435 75	\$1,325 00	\$2,475 00
J. E. Greilick.....	1,450 62	1,300 00	2,508 39
L. A. Merrell.....	1,413 00	-----	-----
Henry Green.....	1,284 00	1,340 00	1,580 00

Awarded June 16, 1886, to Henry Green, in the total sum of his proposition, \$4,204.

PROPOSALS FOR VENTILATING FANS.

Proposals submitted in July, 1885.

B. F. Sturtevant, Boston, Mass. :

- One 10-foot blast wheel, with plate iron housing, shafting, journal, boxes, pulley, etc., complete, guaranteed capacity 60,000 cubic feet per minute, 125 to 150 revolutions per minute with 12 to 20 horse power..... \$750 00
- One 10x16 engine with band wheel complete..... 850 00
- The above blast wheel and engine without iron plate housing.. 1,150 00
- The above blast wheel, engine and housing, complete, except that the engine shall be connected directly to the fan shaft.. 1,500 00
- Four centre draft peripheral discharge disc wheels 30 inches in diameter, 630 revolutions per minute, 2 to 2½ horse power each 160 00
- Four centre draft peripheral disc wheels, 42 inches in diameter, 500 revolutions per minute, 3½ to 4 horse power..... 240 00
- The above eight fans to discharge an aggregate of 60,000 cubic feet per minute.

All the foregoing prices f. o. b. cars in Boston.

Buffalo Forge Company, Buffalo, N. Y. :

- One 14-foot diameter, 6 feet wide, steel fan, complete, ready for connection to engine, guaranteed to deliver 60,000 cubic feet per minute at 13 horse power.
- Eight exhaust fans (disc wheels), placed in the ventilator shafts to remove an aggregate of 60,000 cubic feet of air per minute, ready for connection to motors.
- All the above for..... 2,100 00
- Eight No. 3 1½ horse power Sprague Electric Motors complete, connected with the exhaust fans, all ready for the wireman.. 1,710 00

Sprague Electric Railway and Motor Company, New York :

- Eight electric motors, 1½ horse power each, f. o. b., New York, complete, for 850 00
- Eight electric motors, 1½ horse power each, f. o. b., New York, complete, for..... 1,650 00
- The above for Edison circuit.
- Eight electric motors, 1 horse power each, for 1,130 00
- The above for Brush or Thompson-Houston circuit.

Detroit Blower Company, Detroit, Michigan:

Two 10-foot diameter blast wheels complete.

Two iron scroll plates for enclosing same.

All mason and carpenter work above floor line of engine room, and all necessary work to insure perfect distribution and circulation of air.

Delivery guaranteed at 100,000 cubic feet per minute, with 120 revolutions of each fan, and a total of 20 horse power.

All complete, ready for attachment or power-----\$2,000 00

Huyett & Smith, Manufacturing Company, Detroit, Michigan:

One 60-inch Smith ventilator fan, capacity guaranteed at 60,000 cubic feet per minute, with 10 horse power----- 175 00

Eight 24-inch Smith ventilator fans, aggregate capacity guaranteed at 60,000 cubic feet per minute----- 400 00

Eight 1 horse power Van Depoele electric motors----- 1,000 00

One Van Depoele 10 horse power dynamo----- 800 00

One 24-inch Smith ventilator fan, for laundry----- 50 00

All the above goods delivered at Traverse City.

Placing the above machinery, including all work and materials, and wiring for electric dynamos ----- 275 00

All the foregoing complete for----- 2,700 00

PROPOSALS SUBMITTED IN JUNE, 1886.

B. F. Sturtevant, Boston:

14-foot diameter, 4-feet wide cone-wheel, with shaft, pulley, etc., complete, guaranteed to deliver 100,000 cubic feet per minute at 100 revolutions, and 120,000 cubic feet per minute at 120 revolutions, and at its maximum capacity to require more than 30 horse-power, f. o. b. cars, Boston-----\$1,200 00

1 12 x 18-inch automatic cut-off engine, complete, f. o. b. Boston----- 1,050 00

The above fan and engine, with the engine attached directly 8 to the fan shaft, f. o. b. Boston----- 2,000 00

center-draft, peripheral-discharge disc wheels, 4 30 inches in diameter and 4 42 inches in diameter, to run 650 and 500 revolutions per minute, respectively, and discharge an aggregate of 60,000 cubic feet of air per minute, with an aggregate resistance of from 22 to 26 horse-power, f. o. b. Boston----- 400 00

Buffalo Forge Company, Buffalo, N. Y.:

1 14-foot diameter, 6-feet wide steel fan, with shaft, inlet rings, pulley, etc., complete, f. o. b. Traverse City, guaranteed to deliver 60,000 cubic feet per minute, 13 horse-power----- 900 00

1 14-foot fan, as above, complete, in place----- 1,100 00

9 disc wheels for 60,000 feet of exhaust ventilation per minute, to be placed in the ventilating tower and run by rawhide cables from the engines in the engine-room, complete with pulleys, shaft, hangers, sheaves, cable, etc, f. o. b. Traverse City----- 3,690 00

9 disc wheels, as above, put in place, complete----- 4,450 00

Detroit Blower Company, Detroit:

2 10-foot diameter wheels, with shaft, pulley, journal rings, etc., f. o. b. Detroit-----	\$1,000 00
Or 2 No. 227 fan blowers, complete, guaranteed to deliver 107,000 cubic feet of air per minute at 200 revolutions, or with free delivery 147,418 cubic feet, f. o. b. Detroit-----	9,000 00

Huyett & Smith Manufacturing Company, Detroit:

1 8-foot Huyett & Smith ventilator fan, guaranteed to deliver 100,000 cubic feet of air per minute, with a resistance not to exceed 15 horse-power, complete, in place-----	550 00
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Awarded June 23, 1886, to the Buffalo Forge Company, Buffalo,
N. Y., on the basis of their second proposition, for 1 14-foot
diameter, 6-feet wide steel fan, erected, complete, for----- 1,100 00

PROPOSALS FOR SHAFTING.

Proposals for a definite list of shafting, pulleys, etc., were received from
Roth, McMahon & Co., Chicago, and from Thirlby, Jackson & Co., Traverse
City.

The order was placed with the latter firm at \$115.

Proposals for a further bill of shafting were received from Roth, McMahon
& Co., of Chicago, \$163.18; and Thirlby, Jackson & Co., Traverse City,
\$164.76. The Hannah & Lay Mercantile Co., Traverse City, \$137.50.

Awarded July 15, 1886, to the Hannah & Lay Merc. Co.

Many proposals for smaller lots of goods are not printed herewith.

PROPOSALS FOR MATERIAL FOR PIPE COVERING.

Samuel I. Pope & Co., Chicago:

- $\frac{1}{2}$ inch hair felt, $4\frac{1}{4}$ cents per square foot.
- 1-32 inch asbestos paper, 9 cents per pound.
- Manilla paper, $7\frac{3}{4}$ cents per pound.
- 8 oz. canvas, 40 inches wide, 15 cents per yard.

J. P. Donaldson & Co., Detroit:

- $\frac{1}{2}$ inch hair felt, $4\frac{1}{2}$ cents per square foot.
- 1-32 inch asbestos paper, $8\frac{1}{2}$ cents per pound.
- Manilla paper, 8 cents per pound.
- 8 oz. canvas, like sample, $9\frac{1}{4}$ cents per yard.

The Hannah & Lay Mercantile Co., Traverse City, Mich.:

- $\frac{1}{2}$ inch hair felt, 4 cents per square foot.
- 1-32 inch asbestos paper, 9 cents per pound.
- Manilla paper, $6\frac{1}{2}$ cents per pound.
- 8 oz. stark duck, 29 inches, $10\frac{3}{4}$ cents per yard, delivered.

Awarded September 18, 1886, to the Hannah & Lay Merc. Co., an order
amounting to \$193.37.

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